

American Society of Civil Engineers.

PROCEEDINGS.

Vol. X.—January, 1884.

MINUTES OF MEETINGS.

(Abstract of such as may be of general interest to members.)

OF THE SOCIETY.

JANUARY 2D, 1884.—The Society met at 8 P. M., Vice-President William H. Paine in the Chair; John Bogart, Secretary. Ballots for membership were canvassed, and the following candidates declared elected:

As Members—Frederick Brooks (elected Junior, June 7th, 1876), Boston, Mass.; William Hammond Hall, Sacramento, Cal.; Charles Warren Hunt, New York City; Stillman Williams Robinson, Columbus, Ohio. As Junior—Edward E. Magovern, Hoboken, New Jersey.

The death, December 27th, 1883, of Gen. A. A. Humphreys, U. S. A., Hon. M. Am. Soc. C. E., was announced. A paper by A. V. Abbott, Jun. Am. Soc. C. E., on "Some Recent Improvements in Testing Machines," was read by the author, and illustrated by the stereopticon.

THE ANNUAL MEETING.

JANUARY 16TH, 1884.—The Annual Meeting was held at the House of the Society, beginning at 10 A. M. In the absence in Europe of the President of the Society, the Chair was taken by Vice-President William H. Paine; John Bogart acted as Secretary. The ballot for officers of the Society being declared closed, the following members of the Society were appointed tellers of the vote: Gen. George S. Greene, Mr. Frederick N. Finney, Mr. Charles H. Fisher.

The Annual Report of the Board of Direction* was read by the Secretary, and accepted.

The Annual Report of the Treasurer* was read and accepted.

The Report of the Finance Committee* was read and accepted.

The Secretary presented an abstract of the replies received to the circular asking suggestions as to the place and time for the next Convention, as follows:

| | |
|---------------------------------------|----|
| San Francisco was suggested by..... | 21 |
| Buffalo " " | 17 |
| New York " " | 9 |
| Atlanta " " | 7 |
| Denver " " | 5 |
| Philadelphia " " | 5 |
| Chicago " " | 4 |
| Cincinnati " " | 4 |
| New Orleans " " | 4 |

Each of the following places was suggested by two: Baltimore, Boston, Charleston, Hartford, Niagara Falls, Providence.

Each of the following places was suggested by one: Colorado, Detroit, Florida, Georgia, Ithaca, Jersey City, Louisville, Mt. Washington, Nashville, New Haven, Norfolk, Omaha, Pittsburgh, Portland, Me., St. Louis, Saratoga, Savannah, Topeka, Troy, White Sulphur Springs, Wilmington.

The Secretary also read special notes made by members in communicating these suggestions.

The following letter was read:

BUFFALO, N. Y., Jan. 8, 1884.

JOHN BOGART, Esq.,

Secretary American Society of Civil Engineers, New York, N. Y.

Dear Sir,—We are advised that your Society has now under consideration the point at which its annual meeting shall be held for the current year. We beg leave to suggest that you take the city of Buffalo

* Printed separately.

into consideration in determining this question. As your meeting will occur in the summer time, we think that you will find no more agreeable place in which to hold it. Besides, there are a number of important public works here, and in this vicinity, just completed, and in process of construction, which, no doubt, your members will be interested in examining, and we have no hesitancy in saying that you will be generously welcomed by the citizens of Buffalo, who will feel much honored and complimented in the selection of their city for your meeting-place.

Yours very truly,

JONATHAN SCOVILLE,

Mayor of Buffalo.

R. R. HEFFORD,

President of the Common Council.

J. B. SCHOELLKOPF,

President Buffalo Board of Trade.

WILLIAM THURSTONE,

*Secretary Buffalo Board of Trade
and Buffalo Merchants' Exchange.*

On motion, after discussion, it was determined that the invitation be accepted, that the place for the next Convention be the city of Buffalo, and that the determination of the time of the Convention be referred to the Board of Direction.

The tellers presented the canvass of the ballot for officers: 207 had been received; 4 of these having no endorsement of the members' names, could not be counted, leaving 203 votes canvassed. The following members were formally elected officers of the Society for the ensuing year:

President: DON J. WHITTEMORE.

Vice-Presidents: WILLIAM H. PAINE, JOSEPH P. DAVIS.

Secretary and Librarian: JOHN BOGART.

Treasurer: J. JAMES R. CROES.

Directors: GEORGE S. GREENE, Jr., WILLIAM METCALF, THEODORE COOPER, FRED. GRAFF, WILLIAM R. HUTTON.

Mr. WHITTEMORE, on the announcement of his election as President, said:

Gentlemen, Members of the American Society of Civil Engineers,—Glancing over our catalogue, I note the names of many eminent engineers, who have played important parts in developing and perfecting the various industries of this continent. It is not strange, therefore, that I feel in some degree unworthy of the office you have conferred on me, and incompetent to discharge the duties pertaining thereto with the measure of ability you have a right to expect. Conceding the truth of Bishop Berkeley's oft-quoted line, that "Westward the course of Empire takes its way," it is also true that the western march of civilization fol-

lows paths first demarked and trodden by the American civil engineer; and I apprehend that whatever honor or distinction attaches to the position to which you have chosen me, was generously intended for those members of our profession who have contributed so largely to the establishment of man's empire and the miraculous progress of human enterprise in that region of our vast country with which it is my present fortune to be identified. With this belief I accept the evidence of your partiality gratefully. I cannot acknowledge that any one loves the profession more, or has a higher respect for the members of this Society, or a greater appreciation of the practical value of our organization than myself, and those with whom I am geographically associated. We, of the West, have heretofore worked very much alone. The problems occurring in our battles with Nature's forces have been solved sometimes badly, sometimes well. Contact with others who have encountered similar obstacles, with less labor and less material than we have been compelled to employ, certainly would have tended to diminish the factor of error in our experience. Therefore, we especially realize that one of the marked advantages of this Society lies in the opportunity it affords for the interchange of ideas and the comparison of experience between members; and though we may often depart from our meetings with a humbler esteem of our own personal achievements and capacity, we are yet imbued with a reverence for our profession, and a respect for its members proportionately exalted.

Considering the immensity and importance of the practical results accomplished under your direction in late years, it is not too much to expect that the coming year will give to our Society and the profession the benefit of many papers of exceptional value; especially that the members of this Society, officially and personally, will, by all proper efforts, put forth every reasonable endeavor to promote experimental inquiry as to the strength of all kinds of material used in construction, a field of investigation which seems to present a special opportunity for the employment of practical skill and intellectual force at this time.

Residing so far away, it cannot be expected that I shall be able to preside at all the stated meetings of the Society. Fortunately, however, you have elected distinguished and capable gentlemen to office who reside at or near your headquarters, any one of whom can administer the affairs of the Society with acceptable ability. With great pleasure I note the re-election both of our former Secretary and Treasurer, who have for many years faithfully and ably served you.

The report of the Board of Censors to award the Norman Medal was read, as follows :

JANUARY 16TH, 1884.

To the American Society of Civil Engineers:

The Board of Censors to award the Norman Medal for the year

terminating August 1st, 1883, report that they consider that the award should be made to Papers Nos. CCXLVIII and CCLVIII, "On the Increased Efficiency of Railways for the Transportation of Freight," and "How can Railways be made more Efficient in the Transportation of Freight?", by William P. Shinn, M. Am. Soc. C. E.

Respectfully,

P. ALEX. PETERSON,
F. COLLINGWOOD,
WM. R. HUTTON,
Board of Censors.

On motion, the report was accepted.

The report of the Committee appointed to award the Rowland Prize was read, as follows :

JANUARY 15TH, 1884.

To the American Society of Civil Engineers :

The Committee appointed to award the Rowland Prize for the year terminating August 1st, 1883, report that, in their judgment, the prize should be awarded to Paper No. CCLXIII, "Rebuilding the Monongahela Bridge," by G. Lindenthal, M. Am. Soc. C. E.

Respectfully,

DR. L. A. SMITH,
DE VOLSON WOOD,
JOHN BOGART,
Committee.

On motion, the report was accepted.

The deaths of the following members were announced : Charles L. McAlpine, elected Member December 4, 1867, died January 11, 1884 ; John Griffen, elected Member April 15, 1868, died January 14, 1884.

THE CHAIR (Vice-President WM. H. PAINE).—Two of the committees having requested a short postponement before presenting their reports, general business is now in order.

O. E. MICHAELIS, M. Am. Soc. C. E.—Mr. President, with your permission, I desire to bring before the Society for its consideration, a matter that was suggested to several members during our recent trip to witness the opening of the Cantilever bridge. At that time the matter that gave occasion for these remarks was this : We were in a special train, which had been increased by quite a number of cars in Buffalo, running down to Niagara Falls, and the Secretary was furnished with a number of invitations to a collation there for distribution to the members of the Society. He called upon me to aid him in making the distribution, and

we went through the train distributing the invitations. The membership of the Society is now so large that even our able Secretary is not always sure whom he is addressing, and it was very awkward in handing these tickets out to have a gentleman say : " Give me one of those tickets," and to have to say to him, " Are you a member of the Society ?" to which he might say " No, but I am an official of a large railway corporation," and it would have been hard to refuse a ticket to a gentleman of that sort. It occurred to me that it might be appropriate on such occasions to have some modest badge which could be worn to distinguish the members of the Society, and in order to bring that about I make these remarks. Perhaps there may be suggestions from other members.

THE SECRETARY.—I must say that the experience which Captain Michaelis has spoken of has occurred a number of times, and if we could get some appropriate method by which members could be distinguished without its being too obtrusive, it would be desirable. I know that the American Society of Mechanical Engineers and the American Institute of Mining Engineers both have adopted a little pin which can be worn on the vest. The American Institute of Mining Engineers has a small hammer and pick. The American Society of Mechanical Engineers has an enamel pin with the initial letters of the Society upon it. This seems to be a small matter, but on the trip referred to, its absence was quite annoying. But if the members had worn badges it would have been a very simple matter. This subject is not entirely new. At the time of making arrangements for one of our annual meetings, some years ago, I remember that our friend, now deceased, who was then a Director of the Society, Major George W. Dresser, took the trouble to look up the matter of getting an appropriate pin, and secured some designs. I know that he intended to present those designs. I do not myself know of any especial objection to the suggestion made by Captain Michaelis.

O. E. MICHAELIS, M. Am. Soc. C. E.—Perhaps the idea that I had in mind was suggested by the course pursued by the Military Order of the Loyal Legion. Their little badge is a small piece of sheet metal, with a rosette of perhaps three-eighths of an inch in diameter, which is worn in the button-hole, and on occasions when it is not needed it is carried in the pocket. It is easily seen when occasion demands. Still, to bring the matter to a point, I move that the Board of Direction be requested to prepare a suitable badge, to be worn on occasions when the Society meets as a body.

The motion was seconded.

THE SECRETARY.—Some years ago I tried to accomplish this result by the use of members' tickets, which, I have no doubt, all of you may remember to have received ; but nobody brought his ticket along with him when he ought to have it, and so it did not work. A gentleman

suggests that a little ribbon, that we sometimes use at the Conventions, would do. But as nobody keeps those ribbons, they are lost, and new ones have to be prepared for each occasion.

F. N. FINNEY, M. Am. Soc. C. E.—There is another thing in favor of a badge of that kind. I would suggest that, instead of being worn at the meetings, it be something that could be worn at all times. It is very pleasant, if you are on a train of cars, to meet some gentleman who belongs to this Society, and pass away the time with him. I think if we should have a badge that could be worn at all times, it would be a very great convenience.

O. E. MICHAELIS, M. Am. Soc. C. E.—If there is no objection, I will suggest that the resolution be worded, "a badge to be worn by members at meetings, and which may be worn by them at other times."

THE CHAIR (Vice-President WM. H. PAINE).—The motion, as amended, is, that the Board of Direction should prepare a badge to be worn by the members of the Society at meetings, and which may be worn by them at other times.

The motion was adopted.

THE SECRETARY.—The Committee upon a Uniform System for Tests of Cement is now ready to present a communication, and I am requested to say that the Chairman of that Committee, Mr. D. J. Whittemore, has asked Mr. Eliot C. Clarke, one of the members of the Committee, to read the report.

ELIOT C. CLARKE, M. Am. Soc. C. E.—I may say, in explanation of this paper, that it is not the final report of the Committee. The members of the Committee, living as they do in all parts of the country, have had some difficulty in having a sufficient number of meetings, and they have not yet finally agreed upon a report; but a draft, which has been made by the Chairman and some of the members of the Committee, is submitted for further consideration, or further modification. That is what I propose to read. It is what the report will be substantially, but with some alterations.

Mr. Clarke then read the report.*

ELIOT C. CLARKE, M. Am. Soc. C. E.—This is considered rather as a report of progress on the part of the Committee, showing that we are trying to agree on something. There are some points in this on which we are not all agreed, but which we may agree on later, or modify.

THE CHAIR (Vice-President WILLIAM H. PAINE).—This communication is now before you for discussion, and for motion as to the continuance of the Committee.

* Will be printed subsequently.

J. J. R. CROES, M. Am. Soc. C. E.—I move that the report be accepted.

THE SECRETARY.—The Committee desires leave to present their report for printing at a future time.

J. J. R. CROES, M. Am. Soc. C. E.—The members who are not here want to see it as well as we do. I think that my motion was in the proper form.

D. J. WHITTEMORE, M. Am. Soc. C. E.—Living so far apart, it was necessary for two or three of us to get our heads together, you might say, and formulate something about which the matter could be crystallized, which we could bring to the attention of each member of the Committee. This report is now in such a stage that any member of the Committee might have a suggestion or an amendment which he might desire to see incorporated in it. The sentences sometimes are badly worded, you may notice, and it could be condensed somewhat, perhaps.

J. J. R. CROES, M. Am. Soc. C. E.—I do not understand the object of giving it to the few members here and not allowing it to go before all the members for suggestions.

ELIOT C. CLARKE, M. Am. Soc. C. E.—The object of reading it was that we thought it might be supposed that we were not at work upon it, and we presented this to show that we were trying to agree upon a report, and we wished to show that we had our ideas in such shape as to have something to work upon.

F. COLLINGWOOD, M. Am. Soc. C. E.—Why not let this go forward and be printed as a preliminary report of the Committee? I think it is very valuable, and we ought to accept it in that shape, and I move that it be accepted as a preliminary report of the Committee.

D. J. WHITTEMORE, M. Am. Soc. C. E.—I think it would hardly be fair to put it as the report of the Committee. It is a draft of the report which they have under consideration.

THE CHAIR (Vice-President WILLIAM H. PAINE).—The motion is to accept the report that has been read as a preliminary report of the Committee.

This motion was adopted.

The report was then discussed.*

After this discussion a recess was taken for lunch, which was served in the Society House.

SECOND SESSION.—January 16th, 3 P. M.

Vice-President William H. Paine in the Chair; John Bogart, Secretary.

The report of the Committee on Uniform Standard Time was read by the chairman of that committee, Mr. Sanford Fleming, M. Am. Soc. C. E.

* Discussion will be printed with the report.

The report is printed separately.

The subject was then discussed; the discussion is printed with the report.

The following resolution was adopted:

Resolved, That the American Society of Civil Engineers hereby acknowledge the extent and value of the work accomplished to date by the Committee on Uniform Standard Time, and tender to that Committee hearty thanks and earnest congratulations for the diligence and the intelligent and fruitful labors of which the results have been so well exhibited in the report presented.

Resolved, That the report of the Committee be accepted, and the Committee continued.

The Committee on Preservation of Timber made the following report, through O. Chanut, M. Am. Soc. C. E., Chairman:

Mr. President, the Committee on the Preservation of Timber can only at this time report progress, and ask to be continued. The Committee, singularly enough, is embarrassed by the amount of information it has received. It has been very carefully collecting all the data concerning what has been accomplished in this country and in Europe on the subject. It has made the lives of all those people who are supposed to know anything about it unhappy until they said what they knew; and it has accumulated about two bushels of correspondence, about 800 octavo pages of print, and a good deal of miscellaneous information. Unfortunately, the members of the Committee have other duties, and are scattered all over the country. It has been unable thus far to digest the material it has accumulated. It hopes, however, that before the winter is over it will be able to take the matter in hand, and submit to you a report, which I fear will run to some length, in which it will give in full the results of what experiments have been tried in this country, but also give the data in sufficient detail so that each one upon obtaining that information can form his own conclusions. With this apology for the delay in the preparation of the report, I beg the indulgence of the Society.

On motion, the Committee on Preservation of Timber was continued.

R. H. THURSTON, M. Am. Soc. C. E.—I would like to ask if any action has been taken with a view to making a rendezvous at the next meeting of the American Association for the Advancement of Science, at Philadelphia, next fall. I presume the members know that after the meeting of the British Association that of the American Association occurs at Philadelphia, and arrangements have been made by which members of the British Association shall attend the meetings of the American Association, and *vice versa*; and an attempt is being made, especially by the presiding officers and Secretary of the Section of

Mechanics, which includes all branches of engineering, to secure a large attendance of all interested in applied science. The Society of Mechanical Engineers has taken some action. I am not able to state at the moment what it is. And it is hoped by the officers of the section I mentioned that this Society will take some action to bring together those gentlemen interested at the meetings of the two Associations and especially at the meeting of the Section of Mechanics, in Philadelphia.

THE SECRETARY.—No action has been taken on that subject. It has not been officially brought to the attention of the Society, or of the Board of Direction.

R. H. THURSTON, M. Am. Soc. C. E.—I will say, Mr. President, that the officers of Section D of the American Association for the Advancement of Science will communicate with the Society, with a view to effecting an arrangement by which several technical societies may rendezvous there, and in anticipation of this official action I was anxious to have the matter brought up at this meeting, so that members might be prepared to consider this matter and to meet that action promptly. Circulars are now in the hands of the Committee, and as soon as those circulars are ready to be issued they will be sent throughout the country to all who are interested in applied science, and at the same time the officers of the section will communicate with the officers of the American Society of Civil Engineers, and other technical societies, and endeavor to arrange for a pleasant convention of those societies. I presume that it can be so arranged that members can obtain invitations to the meeting of the British Association. I presume it will be the most interesting meeting of this kind that has ever been had. Prominent engineers from the other side will be present at the meetings, and it is expected that the strongest members of the American Association will be in attendance.

The Annual Meeting then adjourned.

The programme for the meeting, as prepared by the Committee of Arrangements, was as follows; it was carried out in all details:

PROGRAMME FOR ANNUAL MEETING.

The Annual Meeting of the Society will be held January 16th and 17th, 1884, at the Society House.

The Meeting will open Wednesday, January 16th, at 10 A. M. The Annual Reports will be presented, officers elected, reports from Committees on technical subjects presented and discussed. The awards of the Norman Medal and of the Rowland Prize for the past year will be announced.

Lunch will be served at the Society House at 1.30 P. M. After lunch, the session will be resumed at 2.30 P. M.

The members of the Society are invited by Mr. and Mrs. Charles

Macdonald to a reception at their house, No. 247 Fifth avenue, on Wednesday evening, from eight till eleven o'clock.

Thursday, January 17th, members will meet at the New York terminus of the New York and Brooklyn Bridge at 9.30 A. M., or at the Society House at 9 A. M., proceeding thence to the bridge. Under the escort of the engineers of the bridge, the party will take the bridge cars for the Brooklyn terminus, will inspect the engines and cable apparatus, and return to New York.

At 11.30 A. M., at the Department of Tests and Experiments of Fairbanks & Co., 84 Thomas street, by invitation of that firm, members will view the practical working of large horizontal and vertical Autographic Testing Machines, under the direction of Mr. A. V. Abbott, engineer in charge.

At 1 P. M. the steam ferry boat of the New York, West Shore and Buffalo Railway will be taken, at the foot of Desbrosses street, and proceed up the Hudson River to the wharves of that railway opposite New York. Lunch will be served at the new Weehawken Railway Station on the arrival of the boat. By invitation of the officers of the company, the afternoon will be spent in an inspection of the terminal arrangements of the railway.

On Thursday evening, at eight, a reception for gentlemen will be held at the House of the Society, after which supper will be served in the Library.

JOSEPH P. DAVIS,
WILLIAM G. HAMILTON,
JOHN BOGART,
Committee.

The members of the Society, 122 in number, present at the Annual Meeting, Excursions, etc., were:

A. V. Abbott, W. M. Allaire, Edward R. Andrews, Arthur Beardsley, George H. Bishop, H. Bissell, William H. Bixby, H. D. Blunden, James P. Bogart, John Bogart, Alfred P. Boller, H. R. Bradbury, Fred. Brooks, Thomas E. Brown, Jr., Charles B. Brush, C. O. Brown, L. L. Buck, Wm. D. Bullock, Frank A. Calkins, O. Chanute, N. Cheney, James Christie, Eliot C. Clarke, Thomas C. Clarke, F. Collingwood, Alfred G. Compton, A. N. Connett, Casimir Constable, Theodore Cooper, E. L. Corthell, Martin Coryell, J. James R. Croes, J. Foster Crowell, Joseph P. Davis, P. P. Dickinson, E. B. Dorsey, C. Wheeler Durham, Thomas Egleston, N. W. Ellis, Charles E. Emery, John W. Ferguson, F. N. Finney, Charles H. Fisher, Sandford Fleming, George H. Frost, Charles E. Goad, Fred. Graff, Samuel M. Gray, George S. Greene, George S. Greene, Jr., Frank L. Griswold, Stephen S. Haight, William G. Hamilton, George E. Harding, Robert L. Harris, Bentley D. Hasell, William J. Haskins, Charles H. Haswell, Arthur Haviland, Rudolph Hering,

Sandford Horton, John Houston, Charles W. Hunt, William R. Hutton, Thomas W. Jaycox, Joseph M. Knap, E. D. Leavitt, Jr., Gustav Lehlbach, G. Leverich, Thomas D. Lovett, Charles Macdonald, William W. Maclay, Henry Manley, C. C. Martin, William J. McAlpine, Thomas C. McCollom, T. H. McKenzie, George W. McNulty, O. E. Michaelis, Charles H. Myers, W. A. Nichols, Edward P. North, F. O. Norton, E. B. Noyes, S. B. Opdyke, Jr., Joseph O. Osgood, James Owen, A. B. Paine, William H. Paine, Robert E. Pettit, Andrew J. Post, F. C. Prindle, Benjamin Rhodes, Joseph R. Richards, Percival Roberts, Jr., Edward S. Safford, J. Gardner Sanderson, William Sellers, William P. Shinn, S. H. Shreve, T. Guilford Smith, Hamilton Smith, Jr., D. McN. Stauffer, Elnathan Sweet, Cook Talcott, Robert H. Thurston, George C. Tingley, Stevenson Towle, Henry R. Towne, Alfred W. Trotter, John G. Van Horne, C. D. Ward, L. B. Ward, F. W. Watkins, A. M. Wellington, D. J. Whittemore, William H. Wiley, Herbert M. Wilson, William W. Wilson, De Volson Wood, William E. Worthen and Arthur F. Wrotnowski.

REPORT OF THE BOARD OF DIRECTION

For the year ending December 31st, 1883.

Presented and accepted at the Annual Meeting, January 16th, 1884.

The Board of Direction, in compliance with the provisions of the Society law, presents its report for the year ending December 31st, 1884.

As shown by the tabular statements given with this report, there has been during the year an addition of 76 to the various classes of Society membership, including 2 subscribers to the Building Fund not otherwise connected with the Society. The losses have been 37, being 17 by death, 8 by resignation, 9 dropped from the rolls, and 3 transferred to different classifications.

The total number connected with the Society, December 31st, 1883, is 795, classified as follows :

| | | | | | |
|--|-----|------------------|-----|----------|-----|
| Honorary Members, resident.... | 2 | Non-resident.... | 7 | Total... | 9 |
| Corresponding Members..... | | " | 3 | " ... | 3 |
| Members, resident..... | 122 | " | 467 | " | 589 |
| Associates, " | 11 | " | 20 | " | 31 |
| Juniors, " | 14 | " | 53 | " | 67 |
| | | | | — | 687 |
| Making resident..... | 149 | Non-resident.... | 550 | | — |
| Total..... | | | | | 699 |
| Fellows, 66, of whom 8 Members and 1 Honorary Member are included above, leaving..... | | | | | 57 |
| | | | | | — |
| Total Members and Fellows..... | | | | | 756 |
| Subscribers to the Building Fund, 131, of whom 88 are entered in one or other of the above classifications and 4 deceased, leaving | | | | | 39 |
| | | | | | — |
| Total connected with the Society January 1st, 1884..... | | | | | 795 |

Tables showing the classification of membership at the beginning of the year, and the changes during the year, are given in a subsequent part of this report.

It will be seen that the additions to the membership of the Society have been substantially the same as during the previous year. The loss in membership by death, 17 in number, has been much greater than usual.

Under the provisions of the constitution, the prescribed notice has been issued when members of the Society, from any cause, determine not to continue the payment of the annual dues, and in case of inattention to such notice for a period of six months, the name of the member

is, by the law, dropped from the rolls of the Society. Nine such cases have occurred during the past year, and, consequently, the net increase in membership is reduced to that extent. The Board is glad to know, from the expressions of approval which have reached it from many sources, that this, which is believed to be a true business course, meets with the assent of the membership of the Society.

The subject of the increase of membership should, in the opinion of the Board, be considered not only with reference to the advantages to be gained from an addition to the actual number of members, and a consequent addition to the annual income, with the benefits which would result therefrom, mainly in increasing the amount and scope of the publications. But this question should also be looked at with reference to the importance of continuing to require that all additions to the membership shall have the qualifications prescribed by our laws, and shall be desirable as bringing to the Society increased strength and reputation, so that the fact that an engineer is a member of this Society shall amount to something more than that he pays a certain annual sum into its treasury. It has been the endeavor of the Board to consider each application with particular respect to the question as to whether the record given fairly entitles the applicant to a ballot. It does not seem to be inappropriate that the Board should ask the members of the Society to recollect that their endorsement upon the application is a positive statement that each proposer believes the applicant, from personal knowledge, to be in all respects a proper person to be admitted to the American Society of Civil Engineers.

The Annual Convention of the Society was held at the cities of St. Paul and Minneapolis, on June 19, 20, 21 and 22 of the past year, and was more largely attended than any previous Convention, there having been 150 members present. A visit of several days was made by a large number of members, on their way to the Convention, to the city of Chicago, where the National Exposition of Railway Appliances was at that time open. At the same time, under the escort of members of the Western Society of Engineers, visits were made to a number of interesting points at and near Chicago. Between Chicago, and St. Paul and Minneapolis, very excellent arrangements were made for the comfort of the members through the courtesy of the Chicago, Milwaukee and St. Paul Railway Company, and during their stay in the Northwest all the railways gave special attention to the visiting engineers. The details connected with the meetings of the Convention, the excursions and visits to various points on that occasion, and the kind and thoughtful attention shown by so many persons and organizations in the Northwest, have been already stated in the Proceedings of the Society, in which the regular reports of the Convention appeared, but the Board of Direction makes this official record of its sense of the obligations due under these circumstances.

The suggestions which have been made by various members as to the time and place for holding the next Annual Convention, will be submitted at this meeting.

Each year shows an added interest by the members of the Society in these Annual Conventions, and it is believed that the opportunity afforded for the meeting of many engineers from points so remote, will continue to make these Conventions a constantly important element in the work of this Society.

The Building Fund of the Society has been increased during the past year but \$240. The great value of the ownership by the Society of its House is constantly apparent, and the reduction of the fixed charges for rental, which had already become onerous, in the occupation of leased quarters, has already been demonstrated. It may be well during the coming year to again present this subject to the attention of members of the Society, and through them to other persons interested in the progress of engineering, so that the mortgage which still remains upon the property of the Society may perhaps be substantially reduced. None of the ordinary funds of the Society, nor any proceeds from entrance fees or dues, have been applied to the payment for this building, voluntary subscriptions having alone been relied upon.

The Fellowship Fund of the Society has been increased to the amount of \$900 by the addition of six candidates, and all these Fellowship subscriptions of the year are due to the efforts of one member of the Society. The gentlemen who became Fellows, at his suggestion, were persons interested in matters connected with engineering works, to whom this method of association with the Society was particularly agreeable. The Board takes this occasion to suggest to the members of the Society that there are probably many persons with whom members are acquainted, and to whom the suggestion of becoming Fellows of the Society might be agreeable, and who would be glad to receive the publications and attend the Conventions of the Society as Fellows.

At the last Annual Meeting of the Society, and at the Convention, reports were presented from the Committee on Standard Time. The action taken by the railroads of the country in the adoption of certain regulations for securing greater uniformity in time standards, has been that advocated by this Committee, and the circulation of information secured by the Committee has, it is believed, been largely the cause of the important results achieved. An additional report is expected from the Committee at this meeting, and the subject will be open for your discussion.

The Committee on the Preservation of Timber presented reports of progress at the last Annual Meeting and at the Convention. There was also a valuable exhibit at the Chicago Exposition of the results obtained from trials extending through a number of years by various processes of timber preservation, which exhibit was prepared under the auspices of the

Committee, and by members of the Society. It is expected that the Committee will make a report at this meeting.

A report is also expected from the Special Committee on a Uniform System for Tests of Cement, and the subject as presented in that report will be discussed.

Of the several amendments to the Constitution which were proposed and discussed at the last Annual Meeting, only one was adopted, which was an amendment to Article XXXIII of the Constitution, prescribing a modification of the method for future amendments.

The Norman Medal for 1882 was awarded to Paper CCLIII, "Description of some Experiments on the Flow of Water, made during the Construction of Work for Conveying the Water of the Sudbury River to Boston;" the authors of the paper being Messrs. A. Fteley and F. P. Stearns, Members of the Society. The Board of Censors to award the Norman Medal for the past year, will make their report of award at this meeting.

The Rowland Prize, instituted by the Society, will be awarded for the first time at this meeting, the Committee appointed to make this award being expected to report.

The amount designated for this prize has been contributed by Mr. T. F. Rowland, M. Am. Soc. C. E.

The subject of Tests of Structural Materials has for a number of years commanded the attention of this and other engineering societies, and efforts have been made from year to year to interest our legislators in this important subject, and to secure legislation from Congress for the prosecution of a system of tests under the direction of a suitable commission, to be formed of persons especially interested in the subject, and competent to direct such investigations. The Reports of the Board and of Committees, and the discussions printed in our Proceedings, describe the progress and result of these efforts.

Two years since a bill was presented to Congress creating a commission on this subject, which bill did not become a law. There has been, however, introduced into the Army Appropriation Bill, as passed, both for the last and the current fiscal years, the following clause:

"UNITED STATES TESTING MACHINE.—For caring for, preserving, using and operating the United States Testing Machine, at the Watertown Arsenal, ten thousand dollars. Provided, That the tests of iron and steel and other materials for industrial purposes shall be continued during the next fiscal year, and report thereof shall be made to Congress: And provided further, That in making tests for private citizens the officer in charge may require payment in advance, and may use the funds so received in making such private tests, making full report thereof to the Chief of Ordnance; and the Chief of Ordnance shall give attention to such programme of tests as may be submitted by the Ameri-

can Society of Civil Engineers, and the record of such tests shall be furnished said Society, to be by them published at their own expense."

This small appropriation of \$10 000 was scarcely more than what was required for the care of the machine and its use for necessary Government work.

The Chief of Ordnance, however, issued a circular letter embodying the programme prepared by the Board of Direction, in consultation with a number of engineers and manufacturers, and asking the preparation of material for tests. This circular and the programme will be found in our Proceedings, Vol. IX, April, 1883. Owing to the lack of funds, very little has been accomplished.

In the official book of estimates of the War Department, there is included a request for larger appropriations on this account for the next fiscal year. It is the intention of the Board to take such action in the matter as may best tend to secure a speedy prosecution of these important tests.

The fact that the loss to the membership of the Society by death has been very great during the past year, has been already referred to in this report. Included in this number was Mr. James O. Morse, who became a member of the Society February 9, 1853, the year after its organization. He was the Secretary of the Society from December 1, 1854, to November 3, 1869, and its Treasurer from December 1, 1854, to November 3, 1875, a period of 21 years of devoted attention to its interests and of thoughtful care for its welfare.

During the year a letter was received from the Engineering Society of the University of Michigan, requesting the advice and assistance of this Society in securing a uniform basis for engineering degrees. The subject was referred to a committee, which was authorized to confer with representatives of other organizations and institutions of technical education. The report of that committee is published in the Proceedings of the Society for the month of June last.

No amendments to the Constitution or By-Laws have been offered for discussion at this meeting.

During the year an application was received from the Mayor and Councils of the City of Philadelphia for the nomination of two experts in the matter of the pavements for streets of cities. Under the vote of the Society upon the question raised by a similar application last year for the nomination of experts, the Board has felt its duty to comply with this request, and the nominations have been made. The experience of the Board is not such as to render, in its judgment, the receipt of or the compliance with such requests desirable, and the opinion of the Board is adverse to their continuance.

The following tables show the changes and additions during the year in the various classes of Society membership :

On January 1st, 1883, the date of the last report, the membership in the Society was :

| | | | | | |
|----------------------------------|-----|--------------------|-----|-------------|-----|
| Honorary Members, resident . . . | 2 | Non-resident . . . | 8 | Total . . . | 10 |
| Corresponding Members | | " . . . | 3 | " . . . | 3 |
| Members, resident | 129 | " . . . | 436 | " . . . | 565 |
| Associates, " | 11 | " . . . | 19 | " . . . | 30 |
| Juniors, " | 10 | " . . . | 48 | " . . . | 58 |
| | | | | — | 653 |

| | | | | | |
|---------------------------|-----|--------------------|-----|--|--|
| Making resident | 152 | Non-resident . . . | 514 | | |
|---------------------------|-----|--------------------|-----|--|--|

| | | | | | |
|-----------------|--|--|--|--|-----|
| Total | | | | | 666 |
|-----------------|--|--|--|--|-----|

| | | | | | |
|--|--|--|--|--|----|
| Fellows, 63, of whom 9 Members and 1 Honorary Member are included above, leaving | | | | | 53 |
|--|--|--|--|--|----|

| | | | | | |
|-------------------------------------|--|--|--|--|-----|
| Total Members and Fellows | | | | | 719 |
|-------------------------------------|--|--|--|--|-----|

| | | | | | |
|--|--|--|--|--|----|
| Subscribers to the Building Fund, 128, of whom 87 are entered in one or other of the above classifications and 4 deceased, leaving | | | | | 37 |
|--|--|--|--|--|----|

| | | | | | |
|--|--|--|--|--|-----|
| Total connected with the Society January 1st, 1883 | | | | | 756 |
|--|--|--|--|--|-----|

At the present date, January 1st, 1884, the membership is :

| | | | | | |
|---------------------------------|-----|--------------------|-----|-------------|-----|
| Honorary Members, resident. . . | 2 | Non-resident . . . | 7 | Total . . . | 9 |
| Corresponding Members | | " . . . | 3 | " . . . | 3 |
| Members, resident | 122 | " . . . | 467 | " . . . | 589 |
| Associates, " | 11 | " . . . | 20 | " . . . | 31 |
| Juniors, " | 14 | " . . . | 53 | " . . . | 67 |
| | | | | — | 687 |

| | | | | | |
|---------------------------|-----|--------------------|-----|--|--|
| Making resident | 149 | Non-resident . . . | 550 | | |
|---------------------------|-----|--------------------|-----|--|--|

| | | | | | |
|-----------------|--|--|--|--|-----|
| Total | | | | | 699 |
|-----------------|--|--|--|--|-----|

| | | | | | |
|--|--|--|--|--|----|
| Fellows, 66, of whom 8 Members and 1 Honorary Member are included above, leaving | | | | | 57 |
|--|--|--|--|--|----|

| | | | | | |
|-------------------------------------|--|--|--|--|-----|
| Total Members and Fellows | | | | | 756 |
|-------------------------------------|--|--|--|--|-----|

| | | | | | |
|--|--|--|--|--|----|
| Subscribers to the Building Fund, 131, of whom 88 are entered in one or other of the above classifications and 4 deceased, leaving . . | | | | | 39 |
|--|--|--|--|--|----|

| | | | | | |
|--|--|--|--|--|-----|
| Total connected with the Society January 1st, 1884 | | | | | 795 |
|--|--|--|--|--|-----|

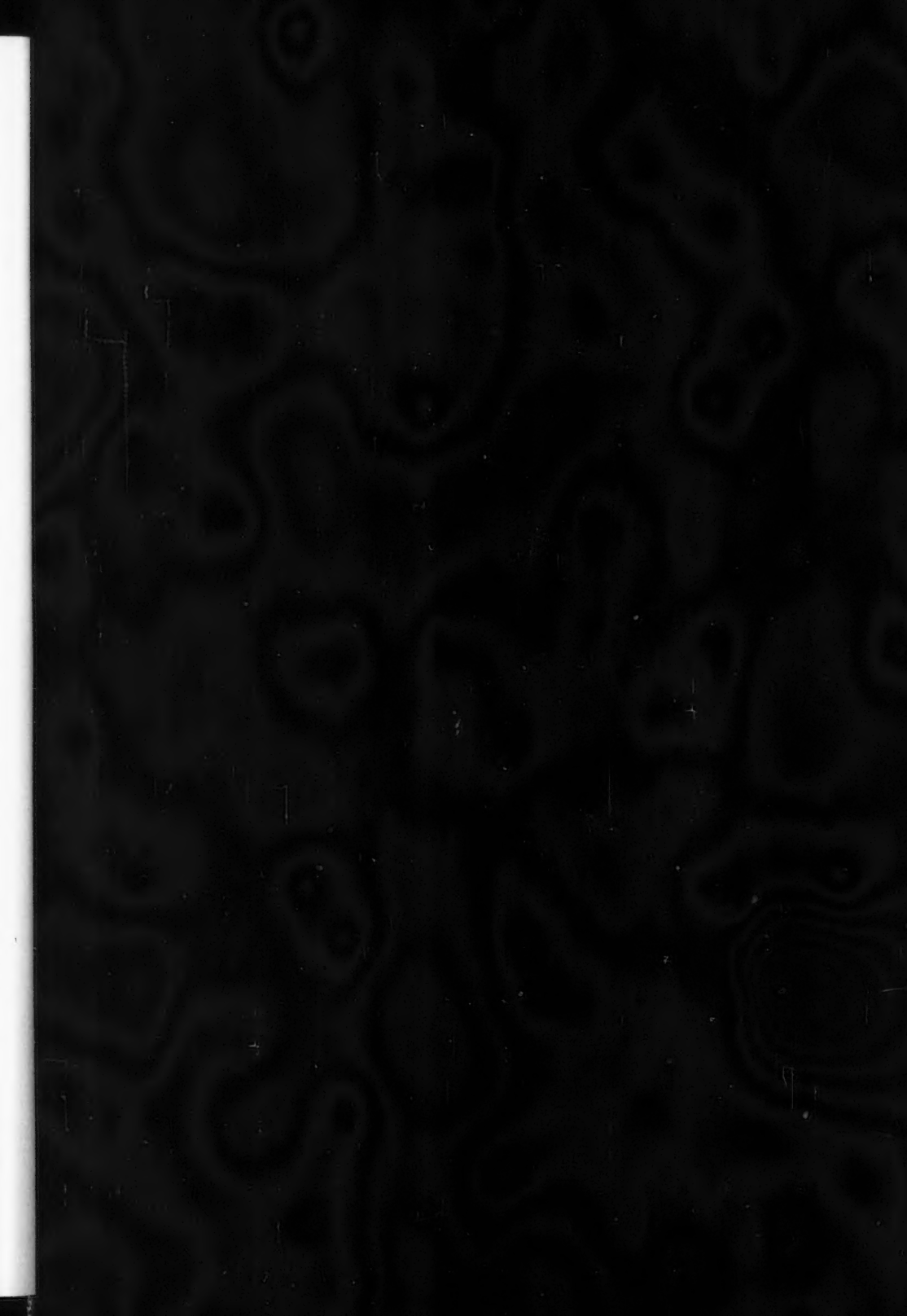
The additions during the past year to the several classes of Society membership have been :

| | |
|--------------------------------|----|
| Members qualified | 54 |
| Associates qualified | 2 |
| Juniors qualified | 12 |
| Fellows qualified | 6 |

| | |
|--|----|
| Total additions to the several classes of membership | 74 |
|--|----|

| | |
|---|---|
| Subscribers to the Building Fund not otherwise connected with the Society | 2 |
|---|---|

| | |
|---------------------------|----|
| Total additions | 76 |
|---------------------------|----|



The decrease during the year in the several classes of membership has been :

| | | |
|-------------------|--|----|
| Honorary Members. | Died 1..... | 1 |
| Members..... | " 14*. Resigned 7..Dropped 9..... | 30 |
| Associates..... | " 1..... | 1 |
| Juniors..... | Transferred to Member 3..... | 3 |
| Fellows..... | Died 2..... | 2 |
| Totals..... | Deaths 17, Resignations 8, Dropped 9, Transferred 3..... | 37 |

There has thus been an addition of 76 to the various classes of membership and subscribers to the Building Fund, and a decrease of 37, making the actual net additions during the year 39 in number.

On January 1st, 1883, there were, as stated in the last Annual Report, 5 proposals pending ; 79 proposals have been received during the year ; 45 candidates have been elected Members, of whom 3 were transferred from Junior ; 2 candidates have been elected Associates ; 10 candidates have been elected Juniors ; 7 candidates have been elected Fellows.

54 persons have, during the year, qualified as Members ; 2 have qualified as Associates ; 12 have qualified as Juniors ; 6 have qualified as Fellows ; 6 candidates elected during the year as Members, and 1 Fellow, have not yet qualified ; there are 9 proposals now pending.

Nineteen meetings of the Society were held during the year, one of which was the Annual Meeting, held in New York January 17th and 18th, and the other the Annual Convention, held in St. Paul and Minneapolis, Minn., June 19th to 22d ; all the sessions of the Convention, including the business meeting, being counted as one meeting of the Society. Meetings have been held on the first and third Wednesday of each month, except July and August.

Twenty meetings of the Board of Direction have been held during the year.

The Library has been increased during the year by the following additions :

| | |
|---|-----|
| Number of books bound..... | 58 |
| " " " unbound..... | 42 |
| " " pamphlets..... | 240 |
| " " maps and plans..... | 90 |
| " " photographs..... | 24 |
| " " drawings, specifications, models and specimens..... | 111 |

* One of these Members was also a Fellow.

These do not include magazines and papers contributed to the Society by publishers, or received in exchange for the Transactions, a list of which is given in an appendix to this report.

The present state of the Library is about as follows :

| | |
|---|--------|
| Books and pamphlets..... | 10 433 |
| Manuscripts..... | 128 |
| Maps, plans, drawings, charts, photographs and engravings.... | 2 343 |
| Models and specimens..... | 430 |

Reports made during the year have been as follows :

By the Board of Direction : The Annual Report.

By the Finance Committee : Annual Report on the Finances of the Society; Quarterly Reports to the Board of Direction.

By the Library Committee : Regular Monthly Reports on the Library and on Publications.

By the Secretary : Monthly Reports to the Board of Direction; Occasional Reports on Current Business.

By the Treasurer : The Annual Report of the Treasurer ; Monthly Reports to the Board of Direction.

By the Committee on Uniform System for Tests of Cement : 1 Report.

By the Committee on Preservation of Timber: 2 Reports.

By the Committee on a Uniform System of Standard Time: 2 Reports.

By the Nominating Committee: 1 Report.

By the Committee on Technical Degrees : 1 Report, and the Committee discharged.

The Treasurer's Annual Report and the Report of the Finance Committee will be submitted at this meeting.

The Society has lost by death, during the term covered by this report, one Honorary Member, Gen. Andrew A. Humphreys, U. S. A.; fourteen Members, Messrs. James O. Morse, past Secretary and Treasurer of the Society, George W. Dresser, past Director of the Society, Gen. Theodore G. Ellis, past Vice-President of the Society, Maj. Francis U. Farquhar, Simeon Sheldon, John C. James, Charles E. Fowler, Arthur Spielmann, Edgar S. Cary, Thomas J. Seely, William R. Morley, George D. Ansley, Redmond J. Brough and Howard Schuyler; and two Fellows, Milton Courtwright and Henry Farnam.

Appropriate memoirs of these deceased members have been or will be published in the Proceedings.

Respectfully submitted,

JOHN BOGART,

Secretary.

REPORT OF THE TREASURER

FOR THE YEAR ENDING DECEMBER 31ST, 1883.

Presented at the Annual Meeting, January 16th, 1884.

RECEIPTS.

| | |
|---|--------------------|
| Balance on hand December 31, 1882, General Fund..... | \$4 719.15 |
| “ “ “ Building Fund..... | 1 511.77 |
| Entrance Fees..... | 1 780.00 |
| Current Dues— <i>For Year ending December 31, 1883:</i> | |
| From 76 Resident Members..... | \$1 875.00 |
| “ 330 Non-resident Members..... | 4 714.25 |
| “ 6 Resident Associates..... | 90.00 |
| “ 16 Non-resident Associates..... | 150.00 |
| “ 13 Resident Juniors..... | 180.00 |
| “ 41 Non-resident Juniors..... | 400.00 |
| | <hr/> |
| | 7 409.25 |
| Past Dues—From 15 Resident Members..... | \$629.13 |
| “ 48 Non-resident Members..... | 823.16 |
| “ 3 Resident Associates..... | 47.50 |
| “ 2 Non-resident Associates..... | 21.66 |
| “ 4 Non-resident Juniors..... | 43.32 |
| | <hr/> |
| | 1 564.77 |
| Dues for Year beginning January 1, 1884 : | |
| From 25 Resident Members..... | \$625.00 |
| “ 93 Non-resident Members..... | 1 364.43 |
| “ 2 Non-resident Associates..... | 20.00 |
| “ 1 Resident Junior..... | 15.00 |
| “ 11 Non-resident Juniors..... | 121.66 |
| | <hr/> |
| | 2 146.09 |
| Sales of Publications..... | 367.57 |
| Certificates of Membership..... | 87.00 |
| Advertisements..... | 146.00 |
| Interest on Fellowship Fund Bonds..... | \$135.49 |
| “ Savings Bank Deposit..... | 15.80 |
| “ Norman Medal Fund Bond..... | 70.00 |
| “ Railroad Stock..... | 82.80 |
| | <hr/> |
| | 304.09 |
| Subscriptions to Building Fund..... | 240.00 |
| Fellowship Fees..... | 900.00 |
| T. F. Rowland for Rowland Prize..... | 50.00 |
| Paris Exhibit Fund..... | 4.33 |
| From called in U. S. Fellowship Fund Bonds..... | 9 000.00 |
| | <hr/> |
| | <u>\$30 230.02</u> |

DISBURSEMENTS.

| | |
|---|-------------------|
| Interest on Mortgage..... | \$800.00 |
| Taxes..... | 503.80 |
| Publications..... | 3 695.16 |
| Stationery and Printing..... | 508.87 |
| Postage..... | 733.56 |
| Library..... | 1 202.99 |
| Salaries..... | 3 000.00 |
| Convention and Annual Meeting..... | 857.58 |
| Janitor, House Supplies, Fuel, Water and Gas..... | 1 168.62 |
| Certificates of Membership..... | 95.40 |
| Insurance..... | 62.50 |
| Norman Medal..... | 92.10 |
| Payments from Building Fund..... | 826.31 |
| Other Expenditures..... | 316.63 |
| Transferred to Savings Bank Deposit..... | 15.80 |
| Finance—Treasurer's Books..... | 400.00 |
| Work of Committees..... | 150.00 |
| Exhibit of Preserved Timber at Chicago..... | 131.89 |
| Purchase of Bonds for Fellowship Fund..... | 8 666.82 |
| On hand—Building Fund..... | \$925.46 |
| “ Fellowship Fund..... | 1 217.38 |
| “ General Fund..... | 4 859.15 |
| | <hr/> 7 001.99 |
| | <hr/> \$30 230.02 |

The Funds of the Society are as follows :

Fellowship Fund :

| | |
|---|-------------|
| Eighty subscriptions to December 31, 1882..... | \$8 150.00 |
| Premium and accumulated interest December 31, 1882..... | 1 903.69 |
| | <hr/> |
| Fund on hand December 31, 1882..... | \$10 053.69 |
| Six subscriptions during 1883..... | 900.00 |
| Interest received during 1883..... | 151.29 |
| | <hr/> |
| | \$11 104.98 |
| Expended for publications during 1883..... | 151.29 |
| | <hr/> |
| | \$10 953.69 |

During the year nine United States Government Bonds were called in, realizing \$9 000, and seven Pennsylvania Railroad General Mortgage Six Per Cent. Bonds were purchased at a cost of..... \$8 666.82

| | |
|---|-------------|
| The present investment of the fund is seven Pennsylv- | |
| vania Railroad Six Per Cent. Bonds, cost..... | \$8 666.82 |
| Deposit in Seamen's Bank for Savings..... | 1 069.49 |
| Cash..... | 1 217.38 |
| | <hr/> |
| | \$10 953.69 |
| | <hr/> |

Norman Medal Fund :

| | |
|---|------------|
| One Certificate Croton Aqueduct Stock, New York | |
| City..... | \$1 000.00 |
| | <hr/> |

General Investment :

| | |
|---|------------|
| 10 Shares New York Central and Hudson River | |
| R. R. Stock..... | \$1 000.00 |
| 1 Consolidated Certificate New York Central | |
| and Hudson River R. R. Stock..... | 35.00 |
| | <hr/> |
| | \$1 035.00 |
| | <hr/> |

Building Fund :

| | |
|---|-------------|
| Receipts previous to January 1, 1883..... | \$16 657.00 |
| " during 1883..... | 240.00 |
| | <hr/> |
| Total to December 31, 1883..... | \$16 897.00 |
| | <hr/> |

Expended :

| | |
|--|-------------|
| For Legal Services, Circulars, &c..... | \$355.03 |
| For Improvements on property..... | 1 616.51 |
| Payments on Purchase..... | 14 000.00 |
| On hand December 31, 1883..... | 925.46 |
| | <hr/> |
| | \$16 897.00 |
| | <hr/> |

Respectfully submitted,

J. JAMES R. CROES,
Treasurer.

REPORT OF THE COMMITTEE ON FINANCE.

PRESENTED AND ACCEPTED AT THE ANNUAL MEETING, JANUARY 16TH, 1884.

The Finance Committee respectfully report, that they have audited all of the bills that have been paid by the Treasurer during the past year, that each bill has been charged to its proper fund, and that their respective amounts have not exceeded the several sums appropriated by the Board of Direction for the specific purposes mentioned.

Your Committee have, at the close of the year, carefully examined all of the assets and liabilities of the Society, and find that the reports of the Secretary and Treasurer give a correct account of the same.

Very respectfully submitted,

W. H. PAINE,

GEORGE S. GREENE, JR.,

WILLIAM G. HAMILTON,

Finance Committee.

LIST OF PUBLICATIONS AND PAPERS RECEIVED FOR LIBRARY.

APPENDIX TO ANNUAL REPORT OF THE BOARD OF DIRECTION,
JANUARY 16TH, 1884.

The following papers are contributed to the Society, or are received in exchange for Transactions :

| | | |
|--|-----------------|---------------|
| American Architect and Building News..... | Weekly..... | Boston. |
| American Engineer..... | " | Chicago. |
| American Gas Light Journal..... | Semi-Monthly.. | New York. |
| Annales des Travaux Publics..... | Monthly..... | Paris. |
| Army and Navy Journal..... | Weekly..... | New York. |
| Builder | " | London. |
| Building and Engineering News..... | " | " |
| Bulletin American Iron and Steel Association..... | Semi-Monthly.. | Philadelphia. |
| Bulletin du Canal Interoceanique..... | " | Paris. |
| Commissioner of Patents' Journal..... | Semi-Weekly.... | London. |
| Deutsche Bauzeitung | Weekly..... | Berlin. |
| Engineer..... | " | London. |
| Engineering..... | " | " |
| Engineering and Mining Journal..... | " | New York. |
| Engineering News and American Contract Journal..... | " | " |
| Genie Civil..... | " | Paris. |
| Iron | " | London. |
| Iron Age..... | " | New York. |
| Journal of the Association of Engineering Societies..... | Monthly..... | " |
| " of Artillery and Military Engineering..... | " | Vienna. |
| " of Society of Arts..... | Weekly..... | London. |
| " of Gas Lighting..... | " | " |

| | | |
|--|--------------|---------------|
| Manufacturer and Builder..... | Monthly | New York. |
| Manufacturer and Iron World..... | Weekly | Pittsburgh. |
| Magazine of American History..... | Monthly | New York. |
| Mechanical News..... | Semi-Monthly | " |
| Norsk Teknisk Tidsskrift..... | Monthly | Christiania. |
| Nouvelles Annales de la Construction..... | " | Paris. |
| Portefeuille economique des Machines..... | " | " |
| Record of Scientific Literature..... | " | New York. |
| Railroad Gazette..... | Weekly | " |
| Railway Age..... | " | Chicago. |
| Railway Review..... | " | " |
| Railway World..... | " | Philadelphia. |
| Reportorium der Technischen Literatur..... | " | Leipsig. |
| Revue Générale des Chemins de fer..... | Monthly | Paris. |
| Sanitary Engineer..... | Weekly | New York. |
| Scientific American..... | " | " |
| Scientific American Supplement..... | " | " |
| Teknisk Tidsskrift..... | Monthly | Stockholm. |
| Techniker..... | Semi-Monthly | New York. |
| Telegraph Journal and Electric Review..... | " | London. |
| The Locomotive..... | Monthly | Hartford. |
| Van Nostrand's Magazine..... | " | New York. |
| Zeitschrift fur Baukunde..... | Quarterly | Munich. |
| Zeitschrift fur Bauwesens..... | " | Berlin. |

The following are subscribed for :

| | | |
|----------------------------------|--------------|------------|
| American Bookseller..... | Semi-Monthly | New York. |
| American Library Journal..... | Monthly | " |
| Bookseller..... | " | London. |
| Publishers' Weekly..... | Weekly | New York. |
| U. S. Official Postal Guide..... | Monthly | Boston. |
| Science..... | Weekly | Cambridge. |

The Society has received during the year, in exchange for the "Transactions," official publications of the following associations, in many instances for preceding years :

| | |
|--|---------------|
| Aeronautical Society of Great Britain..... | London. |
| Academy of Sciences..... | Washington. |
| Akademie des Bauwesens..... | Berlin. |
| American Gas Light Association..... | New York. |
| American Institute of Architects..... | " |
| American Institute of Mining Engineers..... | " |
| American Iron and Steel Association..... | Philadelphia. |
| American Society of Mechanical Engineers..... | New York. |
| Annales de Construcciones Civiles y de Minas..... | Lima. |
| Annales des Ponts et Chaussées..... | Paris. |
| Argentine Scientific Society..... | Buenos Ayres. |
| Association of Civil Engineers..... | Lisbon. |
| Astor Library..... | New York. |
| Austrian Society of Engineers and Architects (Two Publications)..... | Vienna. |
| Boston Public Library..... | Boston. |
| Boston Society of Civil Engineers..... | " |
| Civil Engineers' Club of Cleveland..... | Cleveland. |
| Die Administration der "Mittheilungen"..... | Vienna. |
| Engineers' Club of Philadelphia..... | Philadelphia. |
| Engineers' Club of St. Louis..... | St. Louis. |

| | |
|--|--------------------|
| Engineer Department, U. S. A..... | Washington. |
| Engineers' Society, Western Pennsylvania..... | Pittsburgh. |
| Essayons' Club, Corps of Engineers, U. S. A..... | Willetts Point. |
| Franklin Institute Journal..... | Philadelphia. |
| Imperial School..... | Moscow. |
| Imperial Technic Society of Russia..... | St. Petersburg. |
| Imperial University..... | Tokio. |
| Institution of Civil Engineers..... | London. |
| " " of Ireland..... | Dublin. |
| " of Engineers and Shipbuilders of Scotland..... | Glasgow. |
| " of Mechanical Engineers..... | London. |
| Iron and Steel Institute..... | " |
| Massachusetts Institute of Technology..... | Boston. |
| McGill University, Department of Science..... | Montreal. |
| Mechanics' Institute..... | San Francisco. |
| Midland Institute Mining, Civil and Mechanical Engineers.... | Barnsley, Eng. |
| Mining Institute of Scotland..... | Hamilton. |
| New York Meteorological Observatory..... | New York. |
| North of England Institute of Mining and Mechanical Engineers..... | Newcastle-on-Tyne. |
| Rensselaer Society of Engineers..... | Troy. |
| Royal United Service Institution..... | London. |
| School of Mines, Columbia College..... | New York. |
| Seismological Society of Japan..... | Tokio. |
| Smithsonian Institution..... | Washington. |
| Society of Arts..... | London. |
| Society of Civil Engineers..... | Paris. |
| Society of Engineers..... | London. |
| Society of Engineers and Architects..... | Cologne. |
| Society of Engineers and Architects of Hungary..... | Budapest. |
| " " " of Saxony..... | Dresden. |
| " " " | Hanover. |
| Stevens Institute of Technology..... | Hoboken. |
| Swedish Society of Engineers..... | Stockholm. |
| Thayer Scientific School, Dartmouth College..... | Hanover. |
| Thomason Civil Engineering College, Indian Engineering..... | Roorkee. |
| United States Coast and Geodetic Survey..... | Washington. |
| " " Geological Survey..... | " |
| " " Light House Board..... | " |
| " " Military Academy..... | West Point. |
| " " Naval Institute..... | Annapolis. |
| " " Naval Observatory..... | Washington. |
| " " Ordnance Department..... | " |
| " " Patent Office..... | " |
| University of Michigan..... | Ann Arbor. |
| Western Society of Engineers..... | Chicago. |

ADDITIONS TO LIBRARY AND MUSEUM.

From American Academy, Arts and Sciences, Boston:
Proceedings. May, 1882 to May, 1883. New Series. Vol. X.

From American Institute of Mining Engineers, Dr. T. M. Drown, Secretary, Easton:
Proceedings of the Roanoke, Va., Meeting, June 4th, 1883

The Divining-Rod. R. W. Raymond, Ph. D.
Mining and Storing Ice. W. P. Blake, F. G. S.
The Copper Deposits of the South Mountain.
Hanford Henderson.

The Geological Position of the Philadelphia Gneisses. Prof. C. H. Hitchcock.

The Treatment of Gold-bearing Arsenical Ores at Deloro, Ontario, Canada. Richard P. Rothwell.

The Iron Ores of the Valley of Virginia. Andrew S. McCreath.

The Bower-Barff Process. A. S. Bower, C. E.
The Shelf Dry Kiln. C. A. Stetefeldt.

The Natural Coke of Chesterfield County, Va. R. W. Raymond, Ph. D.

An Hypothesis of the Structure of the Copper Belt of the South Mountain. Dr. Persifor Frazer.

The Langdon Gas Producer. N. M. Langdon.
Cast-iron of Unusual Strength. Edward Gridley.

The Volumetric Determination of Manganese. J. B. Macintosh, E. M.

On the Determination of Manganese in Spiegel, Ferromanganese, Steel, etc. Magnus Troilus.

Leaching Gold and Silver Ores in the West. Thomas Egleston, Ph. D.

The Blast Furnace of the Crozer Steel and Iron Company at Roanoke, Va. J. P. Witherow.

Copper Slime Treatment. F. G. Coggin.
Gold Mining in South Carolina. E. Gybson
Spilsbury.

The Ores of Cripple Creek Virginia O. R. Boyd.

The Method of Collecting Blue-Dust at Ems on the Lahn. T. Egleston, Ph. D.

Some Notes and Tests of an Open Hearth Steel Charge made for Boiler plate. Alfred E. Hunt.

The Determination of Manganese in Spiegel. G. C. Stone.

Porosity and Specific Gravity of Coke. Fred. P. Dewey.

From American Society of Mechanical Engineers, Prof. F. R. Hutton, Secretary, New York:

Transactions. Vol. III. 1882.
List of Members, Officers and Rules. March, 1883.

From American Water Works Association, J. H. Decker, Secretary, Hannibal, Mo.:

Report of Proceedings of the Third Annual Meeting held at Buffalo, N. Y., May 15th, 16th and 17th, 1883.

From Gen. Adna Anderson, St. Paul, Minn.:
Blue Print of the General Profile of the Northern Pacific Railroad.

From Association of Engineering Societies, H. G. Prout, Secretary of Board, New York:
Journal of the Association. May to August, 1883.

From Astor Library, F. A. Saunders, Librarian, New York City:
Annual Reports of the Astor Library, for the years 1877-1882, inclusive.

Recent Accessions to the Astor Library, July, 1881, 1882 and 1883.

List of Periodicals and Serials currently received at the Astor Library, 1882.

From John W. Bacon, Danbury, Conn.:
Thirty-first Annual Report of the Railroad Commissioners of the State of Connecticut. Hartford, 1884.

From H. D. Blunden, New York:
Evidence and Exhibits. The Erwin Crossing case. The New York, Lackawanna and Western Railway vs. the New York, Lake Erie and Western R.R. Elmira, 1882.

From the Board of Supervisors. John A. Russel, Clerk, San Francisco, Cal.:
Municipal Reports of San Francisco, 1882-'83.

From Boston Public Library, Boston:
Bulletin. Vol. V, No. 7.

From Fred. Brooks, Boston, Mass.:
Metric Railway Curves. From *Engineering News*, Oct. 13, 1883. (Several copies.)

From the Bureau of Education, Washington, D. C.:

Report of the Commissioner of Education, for the year 1881.

From Capt. H. W. Clarke, Syracuse, N. Y.:

Proceedings of the Board of City Auditors of the City of Syracuse for the fiscal year, 1883. (2 copies.)

Journal of the Board of Supervisors of the County of Onondaga, N. Y., for 1883.

Report of the Commissioners on the Boundary Lines between the State of New York and the States of Pennsylvania and New Jersey for the year ending December 31st, 1882.

From Joseph P. Davis, New York:
Telephone Suits.—Circuit Court of the United States, District of Massachusetts. In Equity. Bell Telephone Company et al. v. Peter A. Dowd.

Part I.—Pleadings and Evidence. Boston, 1880.

Part II.—Exhibits of Complainants and Defendant. Boston, 1880.

American Bell Telephone Company v. Amos E. Dolbear et al. Brief for Complainants on Motion for Preliminary Injunction. Boston, 1882.

United States Circuit Court, Southern District of New York. In Equity. Irwin and Weston Electric Manufacturing Company v. Metropolitan Telephone and Telegraph Company et al. Brief for Respondents. Boston, 1881.

J. H. Irwin and the Weston Electric Manufacturing Co. v. The Metropolitan Telephone and Telegraph Co. et al. Arguments of J. J. Storrow, Esq., Chauncey Smith, Esq., for Defendants. Boston, 1881.

American Bell Telephone Company et al. v. Ashael K. Eaton et al. Complainants' Moving Papers on motion for Preliminary Injunction. Boston, 1880.

New York Supreme Court.—The People of the State of New York against The Metropolitan Telephone and Telegraph Company:

Papers in Opposition to Motion for Temporary Injunction. New York, 1881.

Points for Defendant, on Motion for Injunction *pendente lite*.

Arguments of Mr. E. P. Wheeler on Underground Telegraph Wires in Cities. In the Matter of the Hearing before the Assembly Committees on Cities and on General Laws relating to Telegraph and Telephone Wires. New York, 1881.

United States Patent Office. The Speaking Telephone: Interferences A-L and No. 1. Briefs for Alexander Graham Bell and Francis Blake. Boston, 1881.

From Dr. T. M. Drown, Easton, Pa.: Technical Training. An address delivered before the Alumni Association of Lehigh University, June 20, 1883. Thomas M. Drown.

From W. A. G. Emonts, Philadelphia, Pa.: Tables for computing Equivalent Metric and Non-Metric Heights and Measures. W. A. G. Emonts, C. E. Philadelphia, 1883. (2 copies.)

From Engineer's Club, Philadelphia, Howard Murphy, Secretary and Treasurer, Philadelphia: Proceedings. Vol. III, No. 4.

From G. Howard Eilers, Chicago: Corporation of Hyde Park, Ill. Annual Message of the President and Reports of the various Officers and Heads of Departments for the year ended April 1st, 1883. Specifications Water Works, Hyde Park. 1882 and 1883.

From Walton W. Evans, New Rochelle, N. Y.: Memoir of Thaddeus Kosciuszko, Poland's Hero and Patriot. New York, 1883.

From Frederic Graff, Philadelphia: Reports on the Philadelphia Water Supply by the Board of Experts appointed in conformity with Ordinance of June 7th, 1882; also, An Investigation of the Circumstances affecting the Potability of the Schuylkill Water Supply in the month of January, 1883. Executed under the authority of the Board of Experts and the Chief Engineer. By Prof. Albert R. Leeds, Ph. D. Philadelphia, 1883. (Several copies.)

From B. M. Harrod and H. B. Richardson. New Orleans: Prospectus of The New Orleans Elevated Railway Co.

From the Institute of Engineers and Shipbuilders, Glasgow, Scotland: Transactions. Vol. XXVI.

From Institution of Civil Engineers, James Forrest, Secretary, London: Minutes of Proceedings. Vol. LXXIII and Vol. LXXIV.

Charter, By-Laws and List of Members. London, 1883.

Excerpt Minutes of Proceedings. Edited by the Secretary, as follows:

Abstracts of Papers in Foreign Transactions and Periodicals. Vol. LXXIII, Session 1882-83, Part III.

A Method of Correcting Errors in the Observation of the Angles of Plane Triangles. Robert Manning.

The Coal and Mineral Deposits of Indo-China. Edmund Fuchs and E. Saladin. Apparatus for Solar Distillation. Josiah Harding.

Tests of German Coals. Dr. H. Bunte. Air-Compressor and Turbine for working Rock Drills and Ventilating Yagasee Tunnel, Japan. Benjamin F. Wright. Cheap Gas for Motive-Power. Joseph E. Dowson.

Resistance on Railway Curves as an Element of Danger. John MacKenzie.

The Diamond Fields and Mines of Kimberly, South Africa. James N. Paxman. On the Blasting of a Channel through a Bar of Basaltic Rock in the River Yarra, at Melbourne, Victoria. Joseph Brady.

On a Deep Boring at Northampton. Henry John Euston.

Raising the S. S. *Austral*. John Standfield.

Water Supply and Irrigation of the Canterbury Plains, N. Z. George Fred'k. Ritao.

The Treatment of Complex Ores and Condensation of Lead Fumes. James Warne Chenhall.

Continuous Girder Bridges. Thomas Claxton Fidler.

On the Preservation of Iron by one of its own Oxides. Benjamin Howard Thwaite.

Graphic Methods of Computing Stresses in Jointed Structures. Charles Ormsby Burge.

Part I. The Water Works of Edinburgh. Alexander Leslie.

Part II. Port Elizabeth, S. A. J. G. Gamble.

Part III. Peterborough. John Addy. Electrical Units of Measurement. Sir William Thomson, F.R.S.

Annual Report of the Council. December, 1883.

Brief Subject Index. Vols. LIX. to LXXIV.

From the Institution of Mechanical Engineers, London: Proceedings. July, 1883.

From the International Institute for Preserving and Perfecting Weights and Measures, Cleveland and Boston:

The International Standard, Nos. 1, 2, 3, 4, and 5.

From L. H. Knapp, Buffalo, N. Y.: General Specifications for Additional Pumping Machinery for the City of Buffalo,

N. Y., together with Specifications of the mode of testing the same, and of estimating its *capacity* and *duty*. Sept. 27th, 1883.

From Engineers' Department, New York, Pennsylvania and Ohio R. R., Charles Latimer, Chief Engineer, Cleveland:

Profiles, Maps and Alignment of Main Tracks, Yards, Switches and Side Tracks of the New York, Pennsylvania and Ohio Railroad and its Branch Lines, together with Information referring to Bridges, Water Supply, Railroad and Road Crossings, Culverts, Grades and Curves; also Locations, Lengths of Divisions, Subdivisions and Sections.

From Magazine of American History, Mrs. Martha J. Lamb, editor, New York:

The Magazine, May to December, 1883.

From McGill College and University, Montreal:

Annual Calendar Session of 1883-84.

From Mining Institute of Scotland, Hamilton:

Transactions, General Meeting, July 5th, 1883.

From Midland Institute Mining, Civil and Mechanical Engineers, Barnsley:

Transactions, July, 1883. Vol. VIII, Part 67.

From George S. Morison, New York:

Specifications for Superstructure of Bridge across the Willamette River at Portland, Oregon, Northern Pacific R. R. G. S. Morison, Chief Engineer.

Specifications for Superstructure of Bridge over the Missouri River, Missouri Valley and Blair Railway and Bridge Co. G. S. Morison, Chief Engineer.

From Hon. Joseph Nimmo, Jr., Chief of Bureau of Statistics, Washington: Statistical Abstract of the United States 1883. 6th number.

Annual Report on the Foreign Commerce of the United States for the Fiscal Year ended June 30, 1883.

Annual Report and Statements of the Chief of the Bureau of Statistics on the Commerce and Navigation of the United States for the year ended June 30, 1883.

From Ohio Mechanics' Institute, Robt.

B. Warder, Editor, Cincinnati: Scientific Proceedings. Vol. II, No. 2.

From Ohio Society of Surveyors and Civil Engineers, Benj. Thompson, Secretary, Urbana:

Reports of the Proceedings of Third and Fourth Annual Meetings, held at Columbus, Jan. 11-13, 1882, and Jan. 17-19, 1883.

From J. L. P. O'Hanly, Ottawa, Canada:

On Money and other Trade Questions, being a Review of Mr. Wallace's Speech on an Incontrovertible Currency. J. L. P. O'Hanly, C. E. Ottawa, 1882.

From E. Pontzen, Paris, France:

Rapport sur les accumuleurs Faure-Sellon-Volkmar. Paris, 1883.

Etude sur l'application des accumulateurs Faure-Sellon-Volkmar a l'Eclairage Electrique par Incandescence et a la Traction des Francais. Paris.

Moerath's Motive Power from Running Waters. J. N. Moerath, C. E. London, 1883.

From Charles Pfaff, C. E., Member International Electric Commission, Vienna, Austria:

Catalogue de l'Exposition Internationale d'Electricité a Vienna, 1883. Vienna, 1883.

From F. C. Prindle, U. S. Navy Yard, New York:

Report of the Hon. J. J. Little, of St. Johns, Newfoundland, on the American System of Dry Docks. New York, 1882.

From H. V. and H. W. Poor, New York: Manual of the Railroads of the United States for 1883. 16th Annual Number. Henry V. Poor. New York, 1883.

From Henry F. Perley, Chief Engineer, Department of Public Works, Ottawa, Canada:

General Report of Sir H. L. Langevin, C. B., K. C. M. G., Minister of Public Works of Canada, for the fifteen years from June 30, 1867, to July 1, 1882. With Maps accompanying the same.

From Royal United Service Institution, Capt. B. Burgess, Secretary, London:

Journal of the Institution. Vol. XXVII, No. 120.

From Smithsonian Institution, Washington, D. C.:

Annual Report of the Board of Regents, for the year 1881.

From Robert Surtees, Ottawa, Canada:

Annual Report of the Water Works Committee of Ottawa, Canada, for the year ending October 31, 1883.

From Second Geological Survey, Pennsylvania, W. A. Ingham, Secretary, Philadelphia:

Geological Report on Warren County and the Neighboring Oil Regions, with additional Oil Well Records. John Carl.

The Geology of Chester County, after the Surveys of Henry D. Rogers, Persifer Frazer and Charles E. Hall.

The Geology of Lehigh and Northampton Counties.

Report on the Mining Methods and Appliances used in the Anthracite Coal Fields. H. M. Chaired.

From Hon. E. Sweet, State Engineer and Surveyor, Albany:

State Engineer's Report on Railroads for 1881 and 1882.

Annual Report of the State Engineer and Surveyor on the Canals of New York, for the fiscal year ending September 30, 1882.

Report of the State Engineer and Surveyor on the Elevated Railways of New York. Dated March 20, 1883.

From J. L. Smith, Philadelphia:

Railway Map of Mexico.

From U. S. Coast and Geodetic Survey, Dr. J. E. Hilgard, Supt., Washington:

Report of U. S. Coast and Geodetic Survey, for 1881. Washington, 1883.

From U. S. Naval Institute, Annapolis: Proceedings Vol. IX.

Index to Proceedings. Vol. IX, Nos. 3, 4 and 5.

- From U. S. Naval Observatory, Washington:
- Astronomical and Meteorological Observations made during the year 1879. Vol. XXVI. Washington, 1883.
- From U. S. Ordnance Department, Gen. S. V. Benet, Chief, Washington, D. C.:
- Ordnance Notes, as follows:
- Military Education and Training. Capt. Walter H. James.
 - Improved Capstan. Capt. Henry Metcalf.
 - Theoretical and Practical Ballistics. Addition to the New Method for Solving Problems of Fire. Capt. Francis Sacci.
 - Armor-Plate Experiments.
 - Report on Naval Experiments against Armor Plating, carried out on the Isle of Amager, under the direction of the Ordnance Select Committee. March, 1883.
 - A Description of some of the Improvements introduced at Frankford Arsenal during the present fiscal year. Maj. S. C. Lyford.
 - Ballistic Apparatus employed by the French Marine Artillery. H. Sebert.
 - On the Various Modes of Transmitting Power to a Distance. M. Arthur Achard.
 - The Effects of the Increased Powers of Infantry Weapons. Capt. R. F. Johnson, R. A.
 - Notes on Field Artillery. Capt. S. C. Pratt, R. A.
 - The Practice Regulations of some European Artilleries. Capt. R. A. Montgomery, R. A.
 - Notes on the Embarkation and Debarkation of Horses and their Care on Board Ship. Lieut. H. Heywood Clark, R. A.
 - The French Army. Prof. H. Barthelemy.
 - Subjects for a Military Library. Bvt. Brig.-Gen. S. B. Holabird.
 - Improved Arm Rack. Lieut.-Col. D. W. Flagler.
 - The Cavalryman and His Horse. Lieut. S. C. Robertson, U. S. A.
 - On the Discovery of Gunpowder by the Chinese.
 - On Outposts. Lieut.-Col. Lonsdale A. Hale, R. E.
 - Researches on the Penetration of Projectiles. Major-General Froloff.
 - Index to Ordnance Notes (Nos. 236 to 259, inclusive).
- From U. S. Patent Office, Washington:
- Annual Report of the Commissioner of Patents for the year 1882.
- From U. S. Signal Service, Gen. W. B. Hazen, Chief, Washington:
- Professional Papers of the Signal Service, as follows:
- Recent Mathematical Papers concerning the Motions of the Atmosphere. [Part I: The Motions of Fluids and Solids on the Earth's Surface. Prof. William Ferrel.
 - Charts and Tables showing Geographical Distribution of Rainfall in the United States. Lieut. H. H. C. Dunwoody.
 - Meteorological and Physical Observations on the East Coast of British America. Oray T. Sherman.
 - Popular Essays on the Movements of the Atmosphere. Prof. William Ferrel.
- From William H. Vibbard, Saratoga Springs, N. Y.:
- Report of the Trial of the Gaskill Pumping Engine at Saratoga Springs, June, 1883. Charles T. Porter.
- From Col. George E. Waring, Secretary National Board of Health, Washington:
- Annual Report of the National Board of Health for 1881.
- From Charles E. Wright, Marquette, Mich.:
- Annual Report of the Commissioners of Mineral Statistics of the State of Michigan for 1882. Lansing, 1883.
- From Gen. H. G. Wright, Chief of Engineers U. S. A., Washington:
- Report of the Results of a Survey of Pawtucket River, Rhode Island, together with a Report of the Preliminary Examination of the same, made in compliance with the requirements of the River and Harbor Act of August 2, 1842. Lieut.-Col. Geo. H. Elliot, Corps of Engineers.
- Papers showing the Maintenance of the Channel at the South Pass, Mississippi River; also copy of Report of Engineer Officer in charge of work, of December 24, 1883, setting forth the necessity of an early appropriation to continue the examinations. (2 copies.)
- Papers relative to the application of the sum of \$75,000 appropriated by the River and Harbor Act of August 2, 1882, for "the erection of a lock and movable dam at Beattyville, at junction of Three Forks, Kentucky River, Kentucky."
- A Letter of the Chief of Engineers, and inclosure of the draft of a bill providing for the operating and care of the harbor of refuge at Sand Beach, Lake Huron, Michigan.
- A Letter from the Chief of Engineers, with inclosure containing draft of a bill for the government and control of the Saint Mary's Falls Canal, Michigan.
- Report of the Select Committee of the United States Senate on the Mississippi River Improvements.
- Reports upon Surveys for a Ship Canal to connect the Chesapeake and Delaware Bays, &c. Lieut.-Col. W. P. Craighill and Capt. Thos. Turtle, Corps of Engineers.
- From other sources:
- The Modern Polytechnic School: Inaugural Address President Charles O. Thompson, delivered at the opening of the Rose Polytechnic Institute, March 7, 1883, Terre Haute, Ind.
 - The Mexican Calendar, or Solar Stone. A lecture delivered before the Academy of Sciences and the Geographical Society of the Pacific, November 19th and 27th, 1883. Eusebius J. Moler.
 - Annual Report of the Eastern Railroad Company for the year ending September 30th, 1883.

American Society of Civil Engineers.

PROCEEDINGS.

Vol. X.—February, 1884.

MINUTES OF MEETINGS.

(Abstract of such as may be of general interest to members.)

OF THE SOCIETY.

FEBRUARY 6TH, 1884.—The Society met at 8 P. M., Vice-President William H. Paine in the chair. Ballots were canvassed, and the following candidates declared elected: As Members—Henry Allen Brainard, Palmyra, N. Y.; William Wallace Hegeman, Hudson, N. Y.; Charles Frederick Loweth (elected Junior January 3d, 1883), St. Paul, Minn.; Charles Conrad Schneider, New York. As Associate—George G. McMurtry, Pittsburgh, Pa. As Juniors—Frank Graef Darlington, Pittsburgh, Pa.; Richard Augustus Hale, Lawrence, Mass. The death was announced of John Avery, M. Am. Soc. C. E., on January 30th, 1884; also the death of Charles A. Smith, M. Am. Soc. C. E., on February 2d, 1884.

A paper by Hamilton Smith, Jr., M. Am. Soc. C. E., on "Water Power with High Pressures," was read by the author, and discussed by Messrs. Collingwood, Cooper, A. H. Emery, Charles E. Emery, Fteley and Hutton.

FEBRUARY 20TH, 1884.—The Society met at 8 P. M., Vice-President William H. Paine in the chair; John Bogart, Secretary. A paper by E. B. Dorsey, M. Am. Soc. C. E., on "Structural Steel," was read by the author, and discussed by Messrs. Cooper, Collingwood, Forney, Frith and North.

OF THE BOARD OF DIRECTION.

JANUARY 2D, 1884.—Applications were considered; arrangements for the Annual Meeting made. The Secretary presented draft of the Annual Report, which was considered.

JANUARY 9TH, 1884.—Applications were considered. The Secretary presented final draft of the Annual Report, which was adopted. A committee—Messrs. Charles Macdonald, Joseph P. Davis and Theodore Cooper—was appointed to confer with similar committees of the American Institute of Mining Engineers and the American Society of Mechanical Engineers on the advisability of extending an invitation to the Iron and Steel Institute of Great Britain to hold a meeting in the United States; the committee to report the result of the conference to the Board.

JANUARY 17TH, 1884.—The following standing committees were appointed:

On Finance—William H. Paine, George S. Greene, Jr., William R. Hutton.

On Library—J. James R. Croes, Joseph P. Davis, Theodore Cooper.

A donation of \$1 000 was presented by Thomas F. Rowland, creating a fund, the interest of which is to be applied for the payment of the Rowland Prize instituted by the Society. Suitable acknowledgment was directed.

Financial business was transacted. Applications were considered.

JANUARY 30TH, 1884.—Applications were considered. Messrs. Michaelis, Boller and T. E. Brown, Jr., were appointed a committee to report to the Board a design for a Society Badge, as directed by the action of the Annual Meeting. A committee was requested to visit Washington, and report to the Board on the subject of the prosecution of tests of structural materials.

FEBRUARY 13TH, 1884.—Applications were considered. The following report was presented:

REPORT AS TO THE PROSECUTION OF TESTS OF STRUCTURAL MATERIALS.

To the Board of Direction of the American Society of Civil Engineers:

The subject of the prosecution of tests of structural materials having been by the Society referred to the Board of Direction, the Board recently requested the Secretary of the Society, and such other members as could conveniently accompany him, to visit Washington to secure such information as could be obtained upon the subject, confer with the Chief of Ordnance, and report to the Board with reference to the present condition of this subject.

In accordance with this request, Mr. Frederic Graff, Director Am. Soc. C. E., Captain O. E. Michaelis, M. Am. Soc. C. E., and Mr. John Bogart, Secretary Am. Soc. C. E., have visited Washington, and beg to report:

The Board to test iron, steel and other metals which was appointed March 25th, 1875, ceased to exist June 30th, 1879, in accordance with Congressional action. The great testing machine which had been constructed under the direction of that Board was then left at the Watertown Arsenal in charge of the Ordnance Department of the United States Army, and the appropriations that have since been made by Congress for the use of this machine have been made to be expended under the direction of that department, and reports of the work of that machine have been made by the Chief of Ordnance, and published through the War Department in Congressional documents.

The appropriation for caring for, preserving, using and operating the machine at Watertown Arsenal for the last fiscal year was \$10 000, and in the law making that appropriation there was included the following clause:

"And the Chief of Ordnance shall give attention to such programme of tests as may be submitted by the American Society of Civil Engineers, and the record of such tests shall be furnished said Society, to be by them published at their own expense."

In accordance with that provision, a programme was prepared by this Board, in consultation with a number of persons interested in the investigation, production and use of structural materials, and including not only members of this Society, but also members of the American Institute of Mining Engineers, and the American Society of Mechanical Engineers.

This programme was presented to the Chief of Ordnance, officially adopted by him, and promulgated by a circular letter issued from the Ordnance Office of the War Department. Copies of the programme and of the Ordnance letter are attached.

The following extract from the official printed report of the Chief of Ordnance to the Secretary of War, gives succinctly the statement of what

has since been done, and also the suggestions of that officer as to desirable action for the future:

"This programme, with a circular letter from this office, was widely distributed among engineers and manufacturers. In the hope that the appropriation for the present fiscal year would suffice, I agreed to pay the cost of transporting the specimens to be tested; but subsequently I had to withdraw my consent, the money appropriated not justifying the expenditure. Under the programme, no specimens have been received for tests, and I am satisfied that no dependence can be, or should be, placed on voluntary contributions in a matter so vital to the material interests of the country. This work is a national affair, and the necessary expense should be borne by the United States. All that should be required of the Society of Civil Engineers is the preparation of a programme for series of tests; the purchase and preparation of material and the making of the tests to be paid out of moneys appropriated by Congress.

"The number of specimens tested on the Watertown Arsenal machine during the year ending June 30th, 1883, was 4 649. Only 539 of this number were for private parties. More than seven-eighths, therefore, of all the tests made were for the Government service. It is fair to believe that this public work will increase from year to year, and that the day is not far distant when the machine will have to be used exclusively on Government work.

"The capacity of this machine is limited to tests of extension and compression. Additional machines should be provided for the tests of torsional and transverse resistance, and estimates have been submitted."

There were also presented by the Chief of Ordnance to the War Department the following estimates for the fiscal year, and with the reduction made by the Secretary of War, as shown, these estimates have been officially approved, transmitted to Congress, and included in the regular Book of Estimates on page 146, and are now officially before the Committee on Appropriations of the House of Representatives.

"BOOK OF ESTIMATES, page 146.

Testing Machine, Watertown Arsenal:

| | |
|--|-----------|
| Caring for, preserving, using and operating the United States Testing Machine at Watertown Arsenal | \$15 000 |
| Purchase of material for specimens, and labor to prepare them | 15 000 |
| Machine to test the torsional resistance of materials..... | 50 000 |
| Machine to test the transverse resistance of materials..... | 50 000 |
| | <hr/> |
| | \$130 000 |
| Reduction by Secretary of War..... | 50 000 |
| | <hr/> |
| Estimate..... | \$80 000 |
| Appropriated last year, \$10 000." | |

It will be seen that these estimates recognize the necessity for a larger sum for making tests of materials, and for an additional sum for purchasing and preparing material to be tested.

We find that while the time of the machine at Watertown Arsenal has been occupied largely in making tests for Government service, yet that the greater proportion of these tests were of small specimens, which could as well, and with greater economy of time and money, have been tested on a very much smaller machine. The necessity of making these tests of small specimens has made it impracticable to secure from the great machine the results which might have been obtained had there been a smaller machine available.

The undersigned therefore consider that if the estimates from the Book of Estimates above quoted can be passed by Congress, it would probably be better to apply such portion of the \$50 000 as may be requisite to secure a machine of moderate capacity for tests for tension and compression, to supplement and relieve the large testing machine.

Our information leads us to believe that this would assure great additions to the effective results. The remainder of the appropriation would then be available for using and operating the machines and for purchasing material.

The undersigned also report, as the result of the information obtained by them, that there is a far greater probability of the passage by Congress of appropriations which are included in the official Book of Estimates, and which have the approval and weight of an executive department, than there is of securing the passage of other bills and appropriations.

The undersigned are of the opinion that the Ordnance Department is ready to make the tests proposed by a programme prepared as provided in the bill, as far as appropriations will permit, and also that the Ordnance Department will approve and recommend the change above suggested, of procuring a machine of more moderate capacity. In order to secure such a change, a letter making the suggestion should be written to the Chief of Ordnance. The undersigned suggest that with this letter should be included a repetition of the reasons heretofore advanced for the prosecution of tests of structural materials. Should the points made in such a letter be approved by the War Department and recommended to Congress, the undersigned believe that there will be a strong probability of securing an appropriation for the prosecution of tests, and that immediate results can be more confidently expected than by any other action that has been suggested, as far as the undersigned are aware.

Should favorable action be taken by Congress, and the appropriation made, additions and modifications of the programme for tests can be made with the advice and co-operation of experts, and of members of the American Institute of Mining Engineers, and of the American Society of Mechanical Engineers, as the original programme was prepared.

The records of tests should be published from time to time, as received, in such a way as to insure a full circulation among all who may be interested.

Respectfully submitted,

FRED. GRAFF,
O. E. MICHAELIS,
JOHN BOGART,
Members Am. Soc. C. E.

February 12th, 1884.

After discussion, a committee of the Board was appointed to prepare a letter to the Chief of Ordnance upon the subject of the prosecution of tests of structural materials, and a circular to members of the Society on the same subject.

CONTRIBUTIONS TO THE BUILDING FUND.

By a resolution of the Board of Direction, all contributions to the Building Fund are to be acknowledged, from time to time, by printing lists of the same in the monthly Proceedings of the Society, and in addition to this the names of all those who may subscribe \$100 or more are to be regularly enrolled and published in future lists of the Society under the head of Subscribers to the Building Fund, and they will be entitled to receive one copy of the monthly publications, comprising all papers and Transactions of the Society, regularly for life, for each \$100 subscribed by them ; such copies to be in addition to those which they may be already entitled to if they are Members or Fellows.

The following contributions up to this time are acknowledged :

| | |
|----------------------------|----------|
| Fred. Brooks *..... | \$100 00 |
| J. Foster Flagg..... | 50 00 |
| Neuchatel Asphalte Co..... | 100 00 |

* Additional subscription to payment previously acknowledged.

REPORT OF THE COMMITTEE ON UNIFORM STANDARD TIME.

Presented at the Annual Meeting, January 16th, 1884. With the discussion and action thereupon.

The report of the Special Committee on Standard Time was presented and read by SANDFORD FLEMING, M. Am. Soc. C. E., Chairman, as follows :

ROOMS OF THE SOCIETY, {
January 15th, 1884. }

The Special Committee on Standard Time beg leave to report :

In presenting this report, it may be well to recall the action taken at various times since the appointment of the Committee at the Montreal Convention in 1881.

At the annual meeting of the Society held in January, 1882, the Committee reported at considerable length. They recognized the great public importance of the question referred to them ; they considered that it practically resolved itself into a movement for reforming our general time system ; they pointed out that the question, from its character, was one which concerned not only the railways and telegraphs of the country, but every member of the community, and, consequently, it became necessary to consult many interests, in order that general concurrence might be obtained in a solution of the problem.

The general importance of the question appeared to the Committee such as to justify an earnest effort to bring it under the notice of as large a number of practical and scientific men as possible, and obtain an expression of opinion from as many as could give it their careful attention.

Accordingly, the Committee, having been duly authorized by the Society, printed a large issue of pamphlets containing various documents fully entering into the whole question, and transmitted them to leading men, including railway officers and others, in every State in the Union, in every province in Canada, and in Mexico. Along with these documents they sent a series of questions, which had been prepared with the view of bringing out every shade of opinion. The Committee specially solicited a careful perusal of the documents, and cordially invited replies to the queries from those who might have time and opportunity to consider the subject before a given date, as the Committee desired to report at the Convention to be held at Washington in the month of May following. The Committee reported at the Washington Convention that they had been favored with a total number of about 1 500 replies to the queries they had issued ; that these replies had come from 137 gentlemen in every part of this continent, who had evidently taken great pains to consider the whole subject ; that with those up to that date heard from, there was a unanimous opinion in favor of a change ; that there was a strong gen-

eral feeling expressed in favor of establishing a comprehensive system of time-reckoning on the basis of the scheme set forth in the documents submitted by the Committee, and that 97 per cent. were in favor of standard time differing by intervals of one hour, thus reducing the standard for the whole of North America to 5 meridians 15 degrees apart.

At the Washington Convention the Society, on the recommendation of the Committee, resolved to petition Congress to take steps to establish a prime meridian as a zero for computing longitude and reckoning time throughout the globe.

At the last Annual Meeting, January 17th, 1883, the Committee reported that Congress had passed a joint resolution authorizing the President to call an International Conference to fix on and recommend for universal adoption a common prime meridian, to be used in the reckoning of longitude and the regulation of time throughout the world.

In conformity with the terms of the act of Congress, the President of the United States has called an International Conference, to be held at Washington on the 1st October next.

At the St. Paul and Minneapolis Convention in June last, the Committee referred to the interest which had been awakened in the question of standard time throughout the world, and reported that the managers of the railways in the United States and Canada, having had their attention directed to the subject, had unanimously resolved to adopt the system of standard meridians submitted by the Committee.

The Committee further reported that the time was near at hand, if it had not actually arrived, when definite action should be taken, by legislation or otherwise, to establish a system of standard time for general use throughout the country.

On the 11th October last, the railway authorities met in convention at Chicago and determined, without further delay, to take energetic action. They decided to adopt the hour standards, and they fixed upon the 18th of November as the day when they would generally begin to operate their lines by the hour meridians. The public with great unanimity acquiesced in the change. It is now generally and universally admitted to be a great public boon.

The Committee feel warranted in saying that the course taken by the Society during the past three years, as above set forth, has had no little influence in promoting the step now brought to a satisfactory issue.

The Committee are of opinion that the next step in time-reform is to abandon the division of the day into halves of 12 hours each, and to adopt a single series of hours, numbered from 1 to 24. The Committee have only to refer to the opinions received in reply to the questions issued in 1882 to satisfy them that the large majority of persons who may carefully examine this branch of the subject will give their unqualified support to the proposal. 92 per cent. of those heard from, up to the date

of the Washington Convention, were in favor of it, and scarcely one person heard from since has expressed an opinion adverse to it.

The Committee is aware that there is a practical difficulty to be met in any attempt to bring the 24 hour division of the day into common use. The necessity of adapting existing clocks and watches to the proposed change is apparently serious, but it has been found easy to overcome at an insignificant cost.

Judging from the emphatic opinions received with regard to the division of the day into a single series of 24 hours, the Committee are justified in inferring that, with the practical difficulty overcome, the railway authorities and the great mass of the people will certainly welcome the change, so soon as its advantages are pointed out and properly appreciated.

This is undoubtedly the second step to be taken in reforming our time system. In some respects it is even more important than the one which has recently been achieved so successfully, and with far greater unanimity than has ever been displayed in any matter affecting so many individuals.

It is the decided opinion of the Committee that if the Society pursues the same course in respect to this second step as it followed in the matter of standard meridians, the time is not far distant when equally satisfactory results will ensue.

FOR THE COMMITTEE:

SANDFORD FLEMING,

Chairman.

DISCUSSION.

T. EGGLESTON, M. Am. Soc. C. E.—Although a member of the Committee, I take the liberty of saying something upon this subject, more especially as I think this Society, as I stated at Minneapolis, has every reason to congratulate itself upon having been the means of introducing a change which is one of the most important historical changes ever made in regard to time. Your Committee has reported that the State Department at Washington was to have had the meridian determined first, but it appears now that standard time is adopted, and the meridian is to be determined hereafter. But, practically, the standard meridian is determined now. When the Convention meet in October, they will have very little to do except to adopt, practically, the plan which is laid out for them by this Society. I do not wish to overrate what has been done by this Society, but the history of it is this. Professor Dowd, of Saratoga, commenced a great many years ago with this question of standard time, but the matter fell through almost without a hearing. It went by because people, and more especially engineers, were not educated up to it. About eight years ago the Metrological Society took up the same question, and they worked with some of the most distinguished men of

this country on the theoretical side of it entirely. They had about abandoned the question when, at the Montreal meeting, this matter was brought up before this Society and the practical side was immediately taken up. The reports of the Society show how the country was educated up to the point; how everything that was settled as a fixed fact was distributed by means of circulars, so that when the Railway Time Convention was called the question almost went without saying.

There is a most unfortunate side to this matter. The Committee had prepared everything so that the Society of Civil Engineers would have introduced this system into the railways of the country, but a misunderstanding caused delay; and during that time other people took the matter up. Mr. Allen deserves great credit for having carried the matter through in the way that he did. I think that the Society is to be congratulated for what it has done; I will not say deserves to be congratulated for what it is going to do, as that has not yet been realized. The Committee gave great attention to this 24 hours movement. I think almost every one of you have realized, when you have had any very long journeys to make, and had to determine when you were to arrive at your destination, that you have found it impossible to do so. It is a study of several hours to find out, for instance, whether you will arrive at any intermediate station between New York and San Francisco by day or night. On some of the most important railroads of Europe, they have been in the habit of printing on their time-tables the day hours in black on a white ground, and the night hours in white on a black ground. The system is a source of very great inconvenience, as I can testify from my own experience when traveling in Europe some two years ago. Having occasion to go from Prague to Ems, I consulted the railway guides as to what time I would arrive at my destination, and I could not find it from them. I consulted the railway officials of the road, and they could not tell me; the consequence was I lost my baggage. Under those circumstances, anybody who has had any such experience—and I do not doubt that everybody in this room has at one time or another gone through experiences of that kind—will perceive that any preventive of that will reduce materially the anxieties and uncertainties of traveling.

Suppose we had the day divided into 24 hours; there would be no mistaking the time of arriving at a given point. If we start at 1 o'clock from anywhere and arrive at 24 o'clock, there is no doubt about the time we arrive. But if we arrive at 10 o'clock, there is an uncertainty of 12 hours as to the time. There has been an effort made to distinguish the different hours by printing with heavier figures. Then with the heavier figures it is a little uncertain which is meant, A. M. or P. M. Most railroads print their time-tables with A. M. and P. M., and quite frequently the A. and the P. become interchanged, and sometimes the P. is left out, or the M., and sometimes both.

The most important question with reference to this matter is what shall be done with the time-pieces already in existence. The Committee are not the only ones that are thinking about this. It is said that about one hundred applications have been presented to the U. S. Patent Office on this subject. As probably most of the members know, the method of dividing the day in this way was in use in Italy 100 years ago, and I think is still in use in Italy, without causing great inconvenience. Some fifteen or twenty years ago I had a collection of watches, which was for its purpose a very valuable one, but which was unfortunately stolen from me, and in a number of those watches the face was divided into 24 hours. Some of the watches went so far as to indicate the hours of the day with figures in black on a white ground, and the night hours with figures in white on a black ground. The twenty-four hours system has been used already in a number of countries, and is used by astronomers all over the world.

Every man has a certain amount of money invested in clocks or watches, more or less valuable. Will it be practicable to alter the clocks without altering the works? It is certainly very undesirable, with a valuable chronometer, to do anything which would change the rate of the balance or the friction. A very ingenious contrivance has been suggested by a newspaper, and a watchmaker, Mr. Henry Fick, 44 Sixth avenue, has proposed two things. I have borrowed a dial from him, from which you will see that there are two circles of figures. Those in the outer circle are in Roman, and those in the inner circle in Arabic. Mr. Fleming has suggested a device which is an extremely simple one, for any watch. Mr. Fleming's watch and Mr. Bogart's are arranged in the same way. The figures are simply pasted over the dial, so that you have the figures in Roman, with the other figures in Arabic above. I hold in my hand a dial made in this same way, in which the dial is enameled. The watch has the figures arranged on the dial exactly as that has. There are three hands. During the first part of the day the long hour hand and the longer minute hand point to the Arabic figures. At 12 o'clock the long part of the hour hand jumps to the minute hand, and the hour hand becomes a short one, so that you have the hands at two different lengths at two different times of the day. This is a very simple device, which can be put into any watch. The matter of the cost of altering the watch is insignificant. The cost of altering the dial-work underneath the face would not be more than 75 cents if you wanted to have the three hands. The cost of Mr. Fleming's method would be so insignificant that it is not worth consideration.

In view of the importance of changing the hours so that there shall be no mistake between A. M. and P. M., your Committee have thought it worth while to inquire from different persons in the country what they would think about it. From the railroad officials we have already had such answers to the question as make us feel perfectly warranted in

going on further in the discussion of this subject, and we hope to present you a report, in a space of time more or less short, that a large majority of the civilized people of the world have adopted, or are ready to adopt, 24 o'clock.

DE VOLSON WOOD, M. Am. Soc. C. E.—I would like to hear that part of the report bearing upon 24 o'clock.

Mr. Fleming read this portion of the report.

DE VOLSON WOOD, M. Am. Soc. C. E.—I was not aware that so much had been done on this one point as to obtain 92 per cent. of answers in its favor. It looks so favorable, that the wonder to me is that the day was ever divided into two parts of twelve hours each. It seems to me that as to the matter of cost in regard to the changing of the time-pieces, while it is very proper that it should be considered even into details, we can recognize the fact that there would be no cost to the majority of people, even if this system were adopted; for I see no more difficulty in reducing 13 or 14 o'clock to the time-piece in hand than I do in reducing from forenoon to afternoon the A. M. and the P. M. Still, I am glad that it has been shown to be so easily done, that there need be no confusion in that regard. It seemed to me such an appropriate measure, that I wished to suggest the propriety of issuing again some form of question or suggestion to the members of the Society, and to all persons interested, who hold positions of responsibility, which I believe is similar to the course followed before—that of asking questions and requesting a reply in writing. Perhaps many have forgotten, as I did, that that particular question was asked before, although it is a question that I have thought of frequently in connection with the subject. It seems to me so eminently practical that we ought to do what we can in favor of the change.

O. E. MICHAELIS, M. Am. Soc. C. E.—I move that the report be accepted and the Committee continued.

ROBERT H. THURSTON, M. Am. Soc. C. E.—I wish to say simply that it has seemed to me that the importance of the work done by this Committee is so exceptional, that we ought to do something more than simply accept the report, continuing the Committee; and I was about to write a resolution, in which the Society was expected to express its appreciation of the work done, acknowledge its value, and compliment the Committee and congratulate the Society on their success, so far as the matter has gone; and then to add that the Committee be continued. If the gentleman has no objection, I would like to offer the resolution as an amendment.

O. E. MICHAELIS, M. Am. Soc. C. E.—I accept the amendment.

SANDFORD FLEMING, M. Am. Soc. C. E.—I am extremely glad to hear what Prof. Wood has just said. As Chairman of the Committee, I am greatly encouraged to go on, if we are permitted to go on, in endeavoring to take a second step in this matter. I have very strong views on

the subject. I am quite sure that if the proper course is taken it will certainly succeed; and as my views are condensed in a short paper, which I presented to the Metrological Society, I will ask your permission to read a portion of that paper.

The VICE-PRESIDENT.—It is entirely proper, and as it is immediately connected with this motion, we will hear it.

SANDFORD FLEMING, M. Am. Soc. C. E.—These were notes read before the Metrological Society a few weeks ago. I will only read a few of the last pages :

“The inconveniences resulting from the division of the day into halves are well known, but they have generally been looked upon as unavoidable, and, consequently, have been philosophically and silently endured. Such evils are experienced chiefly by travelers, but in this country, where all are travelers, there are few who have not been baffled in their efforts to solve the intricacy of railway time-tables. Is there one who cannot recur to frequent mistakes and disappointments to himself and others, springing directly from this cause? The reason why railway time-tables are unintelligible and exceedingly troublesome to all who have occasion to consult them, is the distinction necessary to be made between the 12 hours before noon and the 12 hours which follow noon. It is held there is no necessity for this distinction, that it is awkward and inconvenient, and that the expressions ante meridian and post meridian, or their contractions, A. M. and P. M., should be abolished. It is difficult to understand how the 12-hour division crept into use. It may have been at a period when common education was at a low ebb. In dealing with marketable commodities, the practice of reducing arithmetical quantities to dozens was introduced. Such practice is no longer necessary, as most people nowadays can count higher than 12; the division of the day in accordance with this old custom is now indefensible, and not a single reason can be given why the same numbers should do duty twice on our clocks and watches, to indicate, as they now do, two distinct and separate hours. The division of the day into halves at noon is unnatural, as well as unnecessary and inconvenient. The only division of the day indicated by nature is that of daylight and darkness. Had these portions been subdivided into separate sets of hours, making 6 o'clock come at noon instead of 12 o'clock, it would have been at least in harmony with nature, and, in some respects, more rational than the present method. The more the subject is considered, the more it will be found that the traditional usage which we follow has no advantage, while it has many disadvantages. Every argument points to the expediency of abandoning the halving of the day at noon, and the adoption of a consecutive numbering of the hours in a single series up to 24. The present system is felt to be an impediment to general intercourse, and the removal of all such impediments is of such great and enduring importance as to do away with every consideration of tradition or habit,

however ancient and long continued. It has been urged against the proposed change that the clocks and watches that exist would be rendered useless by its general adoption. This would, no doubt, be an insuperable objection, if the difficulty was more than apparent. It is not, however, a valid objection, as it will be an easy matter to utilize every time-keeper now in use. It will only be necessary to furnish them with new dials, or to place on the old dials the additional afternoon hours, 13 to 24. These should be in Arabic, in a circle within the present Roman figures. The latter change can be effected at a cost too trifling to be considered. It will take some time to accustom ourselves to the new numbers of the afternoon hours. The man who usually leaves off work at 6 o'clock P. M. might consider that he had ground of complaint if he was asked to continue until 18 o'clock. A lady inviting her friends to a 5 o'clock tea would at first excite some amusement by inviting them to a 17 o'clock tea; but the change once established, and its advantages realized, the mind would soon become familiar with the strange expression, and in a marvellously brief space of time the new sounds would become familiar to the ear. One thing is perfectly obvious: the general movement has made substantial progress. Only a very few years have rolled away since the proposition took form to substitute for the time-honored practice a more scientific, more simple, and more suitable system. Public interest is now thoroughly awakened to the importance of the subject. Within the past few months, the representatives of 100 000 miles of railway have emphatically pronounced in favor of the change. They have with singular unanimity, and with the hearty approval of fifty millions of people, taken a decided course in initiating the scheme of time-reform. On this continent, at least, the first step is now irrevocably taken. Is not the second step to abolish the practice of halving the day and counting the subdivisions by dozens? Does not the question of the hour become, how soon shall we count up to 24 o'clock? This question may be answered at an earlier day than many anticipate."

FRED BROOKS, M. Am. Soc. C. E.—We seldom have upon the dials of our clocks and watches the characters appropriate for designating numbers. We have such characters as IX and VI; and it would be about as easy to remember that IX meant 21, as it is now to remember that it means 9.

The anxiety felt about the figuring of dials is greater than is called for; we seldom read the marks; we merely notice upon what part of the circle they are placed. Upon a church tower near my home is a clock dial consisting of twelve stars exactly alike, arranged in the places of the usual letters; and there is no difficulty in telling time by it.

T. EGGLESTON, M. Am. Soc. C. E.—I will guarantee from observation that not one man in a dozen ever reads the figures when he looks at the clock. By the lettered clocks of *Rogers, Peet & Co., New York Times*, and others, you tell the time just as well as if figures were there.

F. BROOKS, M. Am. Soc. C. E.—We depend upon astronomers to measure time for us ; so it is in order to quote from Sir J. F. W. Herschel's Outlines of Astronomy the following passage from Art. 147 and its footnote ; the italics are the author's :

“ Astronomers, even when they use mean solar time, depart from the civil reckoning, commencing their day at noon, and reckoning the hours from 0 round to 24. Thus 11 o'clock in the forenoon of the second of January, in the civil reckoning of time, corresponds to January 1 day 23 hours in the astronomical reckoning ; and 1 o'clock in the afternoon of the former, to January 2 days 1 hour of the latter reckoning. This usage has its advantages and disadvantages, but the latter seem to preponderate ; and it would be well if, in consequence, it could be broken through and the civil reckoning substituted. *Uniformity in nomenclature and modes of reckoning in all matters relating to time, space, weight, measure, &c., is of such vast and paramount importance in every relation of life as to outweigh every consideration of technical convenience or custom.* The only disadvantage to astronomers of using the civil reckoning is this : that their observations being chiefly carried on during the night, the day of their date will, in this reckoning, always have to be changed at midnight, and the former and latter portion of every night's observations will belong to two differently numbered civil days of the month. There is no denying this to be an inconvenience. Habit, however, would alleviate it ; and *some* inconveniences must be cheerfully submitted to by all who resolve to act on general principles. All other classes of men, whose occupation extends to the night as well as day, submit to it, and find their advantage in doing so.”

I hope the Committee will communicate with astronomers, with a view to securing that uniformity of all time reckonings which is pre-eminently desirable, as soon as permitted by the lapse of the time for which almanacs are already computed in advance.

F. COLLINGWOOD, M. Am. Soc. C. E.—There is one thing to be thought of. The first attempt to put 24 numbers in the circle on any dial would be very apt to crowd it so that it would be less easy to distinguish the numbers. Now, a very simple arrangement could be made—say 1 o'clock was put at the first figure, and then all the odd figures put on the outside of the dial and the even numbers inside of it. By that means you save the crowding. And then as to the suggestion made that you might change the rate of the clock, as a practical watchmaker, I can see no difficulty in changing the wheels under a dial without changing the rate at all. I think that a new set of wheels can be cut, and proper pinions adjusted, so that the movement would have the same friction.

T. EGGLESTON, M. Am. Soc. C. E.—For an ordinary watch, but not for a chronometer.

F. COLLINGWOOD, M. Am. Soc. C. E.—You certainly could for a

watch. Whether it could be done for a chronometer or not, I am not prepared to say. But you can change the pinion and the wheel without altering the friction. You might perhaps alter the rate.

T. EGGLESTON, M. Am. Soc. C. E.—That involves expense, and the object of the Committee has been to deal with existing things. There are certainly two or three million watches which will need to be altered at a very little expense.

R. L. HARRIS, M. Am. Soc. C. E.—As to the objection stated by Mr. Brooks, I think within a few months we have had a little discussion on that matter which would entirely eliminate that objection in regard to astronomers. It really places the beginning of the day at the 180th meridian from Greenwich, which is desirable, so that the time is started in the middle of the Pacific Ocean, which would bring the middle of the day to Greenwich, and so eliminate the objection spoken of.

O. E. MICHAELIS, M. Am. Soc. C. E.—I suppose we have all read a certain graphic description of the danger of navigation without a nautical almanac. I would like to hear the Chairman explain how, if the hours are to begin at midnight, he expects to reconcile the method he proposes with the almanacs now in use, which I believe are calculated five and six years ahead.

SANDFORD FLEMING, M. Am. Soc. C. E.—I do not understand the gentleman. We are not proposing to interfere with the almanac. We are only suggesting that the division of the day into two halves should be abandoned.

The VICE-PRESIDENT.—Captain Michaelis might perhaps make that a little better understood. Mr. Fleming did not understand his remark.

O. E. MICHAELIS, M. Am. Soc. C. E.—The Nautical Almanac, as calculated at the Naval Observatory, is already divided into 24 hours, but divides the days at noon instead of dividing at midnight.

SANDFORD FLEMING, M. Am. Soc. C. E.—I think, sir, you will see that the Nautical Almanac, which is generally used for finding the position of ships at sea, will perform its functions in the future the same as it has done in the past. This is in regard to the keeping of time on land. We are not in the least interfering with the mode of ascertaining the situation of ships at sea.

F. COLLINGWOOD, M. Am. Soc. C. E.—I do not think any of us ought to take it for granted that this work is complete yet. I have been at Pittsburgh for the past four or five months, and there they still use the old time. They reckon in two times there—in fact, in three, if they are going west. A good many people say that the new system is a humbug, and, as engineers, I think we ought to see that it is adopted. Even in such a society as the Engineers Society of Western Pennsylvania, a resolution was presented one evening to the effect that the Common Council be requested to adopt the standard time now in use on the railroads. A prominent engineer, a member of our Society, took exception to this

on the ground that it had not yet been tried. I took occasion to say that I had once lived in a town through which a railroad first passed some thirty years ago, whose time was 11 minutes faster than the time previously prevailing in the town. The time was changed simply by setting the town clock ahead, and the people all adopted it. The resolution I speak of was passed by that society.

The VICE-PRESIDENT.—The question is on the motion as amended, as follows :

“Resolved, That the American Society of Civil Engineers hereby acknowledges the extent and value of the work accomplished to date by the Committee on Uniform Standard Time, and tenders to that Committee hearty thanks and earnest congratulations for the diligence and the intelligent and fruitful labors of which the results have been so well exhibited in the report presented.

Resolved, That the report of the Committee be accepted and the Committee continued.”

The resolution was adopted.

LIST OF MEMBERS.

ADDITIONS.

MEMBERS.

Date of Election.

| | | |
|-----------------------------|---|---------------|
| BRAINARD, HENRY A..... | Phoenix, Oswego Co., N. Y..... | Feb. 6, 1884. |
| BROOKS, FRED..... | (Elected Junior, June 7, 1876), 130 Boylston street, Boston, Mass..... | Jan. 2, 1884. |
| CARREL, FREDERICK J..... | Cascade Locks, Oregon..... | Mar. 5, 1884. |
| FIELDS, SAMUEL J..... | Ch. Eng. Niagara Bridge Works, Buffalo, N. Y..... | " " " |
| FITCH, ASA B..... | 7½ North Sixth street, Terre Haute, Ind..... | " " " |
| GRISWOLD, FRANK L..... | (Morse & Griswold), 12 Cortlandt street, New York City..... | May 2, 1883. |
| HALL, WILLIAM HAMMOND..... | State Engineer, Sacramento, Cal..... | Jan. 2, 1884. |
| HAYES, EDMUND..... | (Elected Junior, March 6, 1878), Union Bridge Co., Buffalo, N. Y..... | Mar. 5, 1884. |
| HEGEMAN, WILLIAM W..... | Rhinebeck, N. Y..... | Feb. 6, 1884. |
| HILL, ALBERT B..... | (Elected Junior Feb. 6, 1876), City Engineer, New Haven, Conn..... | Mar. 5, 1884. |
| HOYT, WILLIAM E..... | Ch. Engineer Rochester and Pittsburgh R. R., Rochester, N. Y..... | " " " |
| HUNT, CHARLES W..... | 238 West Twenty-second street, New York City..... | Jan. 2, 1884. |
| LOWETH, CHARLES F..... | (Elected Junior Jan. 3, 1883), 42 Mannheimer Block, St. Paul, Minn..... | Feb. 6, 1884. |
| MAIS, HENRY C..... | Engineer-in-Chief for the Colony of South Australia, Adelaide, S. A..... | June 6, 1883. |
| MCDONALD, HARRY P..... | Columbia, Tenn..... | Mar. 5, 1884. |
| MORSE, CHARLES J..... | Morse Bridge Co., Youngstown, Ohio..... | Feb. 6, 1884. |
| NEXSEN, ELBERT..... | P. O. Box 23, Stillwater, Minn..... | Dec. 5, 1883. |
| ROBINSON, STILLMAN W..... | Prof. Mech. Eng. Ohio State Univ. and Inspector of Railroads and Bridges for State Com. of Rys., 1205 N. High street, Columbus, Ohio..... | Jan. 2, 1884. |
| SCHNEIDER, CHARLES C..... | 35 Wall street, New York City..... | Feb. 6, 1884. |
| STAATS, JOHN H..... | 104 Hudson street, Jersey City, N. J..... | Mar. 5, 1884. |
| STEVENS, FRANK S..... | Princ. Asst. Eng. New York, West Shore and Buffalo Ry., Weekawken, N. J..... | Oct. 3, 1883. |
| WOLCOTT, CHRISTOPHER C..... | Civil Engineer U. S. N., U. S. Navy Yard, Mare Island, Cal..... | Mar. 5, 1884. |

JUNIORS.

| | | |
|-------------------------|--|---------------|
| DARLINGTON, FRANK G.... | Eng. Maintenance of Way, Pittsburgh, Cincinnati and St. Louis Railway, Pittsburgh, Pa..... | Feb. 6, 1884. |
| HALE, RICHARD A..... | Essex Company, Lawrence, Mass..... | " " " |
| WHISTLER, THOMAS D.... | South Orange, N. J..... | Mar. 5, 1884. |

FELLOW.

| | | |
|-------------------------|---|----------------|
| DE GARAY, FRANCISCO.... | Civil Engineer, City of Mexico, Mexico. | Aug. 31, 1883. |
|-------------------------|---|----------------|

CHANGES AND CORRECTIONS.

MEMBERS.

| | | |
|-------------------------|---|--|
| BATES, ONWARD..... | (Care C. Shaler Smith), Bridge Entrance, St. Louis, Mo. | |
| DOANE, WALTER A..... | Rocky Mt. Div. Canadian Pacific R. R. (Care H. S. Holt), via Winnipeg, Manitoba. | |
| FELTON, SAMUEL M., JR.. | Asst. to President New York, Lake Erie and Western R. R., Cleveland, Ohio. | |
| FLAGG, J. FOSTER..... | 161 Camp street, New Orleans, La. | |
| FLINT, EDWARD A..... | 12 Tremont Bank Building, Boston, Mass. | |
| FTELEY, ALPHONSE..... | Executive Eng. Aqueduct Commission, 108 Tribune Building, New York City. | |
| FULLER, SIDNEY T..... | Hotel Glendon, Boston, Mass. | |
| GATES, HORACE D..... | 301 Lombard street, San Francisco, Cal. | |
| GODWIN, BRYANT | 49 Chambers street, New York City. | |
| HARDING, HENRY..... | Hartland Four Corners, Vt. | |
| HUGHES, WILLIAM M.... | Room 57, City Hall, Cleveland, Ohio. | |
| HUNT, RANDELL..... | 24 Mannheimer Block, St. Paul, Minn. | |
| LINDENTHAL, GUSTAV.... | Lewis Block, Pittsburgh, Pa. | |
| MCGRATH, WALLACE.... | Erie, Pa. | |
| MOORE, ROBERT..... | 325 Chestnut street, St. Louis, Mo. | |
| POE, ORLANDO M..... | Lt.-Col. Corps of Engineers, Bvt. Brig.-Gen. U. S. A., 35 Congress street West, Detroit, Mich. | |
| SCHMIDT, MAX O. E..... | Mexican Central R. R., Tampico, Mexico. | |
| SCHUYLER, JAMES D | 610 Folsom street, San Francisco, Cal. | |

JUNIORS.

| | |
|------------------------|--|
| CONNETT, ALBERT N..... | (Care E. W. Wellington), Carneiro, Kansas. |
| HORTON, SANDFORD..... | Sibley, Iowa. |
| STEVENS, HORACE E..... | P. O. Box 2396, St. Paul, Minn. |
| WILSON, HERBERT M.... | U. S. Geological Survey, Washington, D. C. |

DEATHS.

- AVERY, JOHN.....Elected Member December 4th, 1867. Died January 30th, 1884.
- GRIFFEN, JOHN.....Elected Member April 15th, 1868. Died January 14th, 1884.
- HUMPHREYS, ANDREW A...Elected Honorary Member May 7th, 1873. Died December 27th, 1883.
- McALPINE, CHARLES L...Elected Member December 4th, 1867. Died January 11th, 1884.
- SCHUYLER, HOWARD.....Elected Member June 7th, 1882. Died December 3d, 1883.
- SEELY, THOMAS J.....Elected Member February 1st, 1882. Died October 2d, 1883.
- SMITH, CHARLES A.....Elected Member April 7th, 1880. Died February 2d, 1884.
- SPIELMANN, ARTHUR.....Elected Associate March 5th, 1873. Elected Member September 5th, 1877. Died November 29th, 1883.
- FARNAM, HENRY.....Elected Fellow November 14th, 1872. Died October 4th, 1883.

American Society of Civil Engineers.

PROCEEDINGS.

Vol. X.—March, 1884.

MINUTES OF MEETINGS.

(Abstract of such as may be of general interest to members.)

OF THE SOCIETY.

MARCH 5TH, 1884.—The Society met at 8 P. M., Vice-President William H. Paine in the chair; John Bogart, Secretary. Ballots were canvassed, and the following candidates declared elected: As Members—Frederick J. Carrel, Cascade Locks, Oregon; Samuel James Fields, Buffalo, N. Y.; Asa Betts Fitch, Terre Haute, Ind.; Edmund Hayes (elected Junior March 6th, 1878), Buffalo, N. Y.; Albert Banks Hill (elected Junior February 2d, 1876), New Haven, Conn.; William E. Hoyt, Rochester, N. Y.; Harry P. McDonald, Louisville, Ky.; Frederick Sylvester Odell, New York, N. Y.; John Henry Staats, Jersey City, N. J.; Christopher Columbus Wolcott, Mare Island, Cal. As Junior—Thomas Delano Whistler, South Orange, N. J.

A description of the chimney of the Pacific Mills, at Lawrence, Mass., built under the direction of Hiram F. Mills, C. E., and of the chimney of the Merrimack Manufacturing Company, at Lowell, Mass., built under the direction of J. F. Baker, C. E., and the chimney of the New York Steam Company, built under the direction of Charles E. Emery, M. Am. Soc. C. E., were presented, and the subject of chimney construction was discussed by Messrs. Brinckerhoff, Cooper, Croes, Emery, Griswold, J. M. Knap, Prindle and Worthen.

MARCH 19TH, 1884.—The Society met at 8 P. M., Vice-President William H. Paine in the chair; John Bogart, Secretary. A paper by E. B. Dorsey, M. Am. Soc. C. E., "On the Comparative Liability to and Danger from Conflagrations in London and New York," was read by the author, and discussed by Messrs. Bogart, Cooper, J. P. Davis, Dorsey,

W. P. Esterbrook, Just, Hamilton Smith, Jr., C. D. Watkins and Wellington.

OF THE BOARD OF DIRECTION.

MARCH 5TH, 1884.—Applications were considered. Messrs. L. F. Beckwith and T. C. McCollom, Members Am. Soc. C. E., were added to the Committee on a Uniform System for Tests of Cements, the President having retired from that committee. The committee appointed to prepare a letter to the Chief of Ordnance upon the subject of the prosecution of tests of structural materials, and a circular to members of the Society on the same subject, reported the preparation of the letter and the following circular, which was directed to be issued to members:

AMERICAN SOCIETY OF CIVIL ENGINEERS, }
127 EAST TWENTY-THIRD STREET, }
NEW YORK, March 17th, 1884. }

To Members of the American Society of Civil Engineers:

Sir,—The subject of measures to be advocated for securing a continuance of tests of iron, steel and other structural materials was referred by the Society to the Board of Direction.

The Board finds that there has been included in the Official Book of Estimates of the War Department a recommendation that Congress should make the following appropriations:

| | |
|---|-----------|
| Caring for, preserving, using and operating the United States testing machine at Watertown Arsenal..... | \$15 000 |
| Purchase of material for specimens and labor to prepare them..... | 15 000 |
| Machine to test the torsional resistance of materials..... | 50 000 |
| Machine to test the transverse resistance of materials..... | 50 000 |
| | <hr/> |
| | \$130 000 |
| Reduction by Secretary of War..... | 50 000 |
| | <hr/> |
| Estimate..... | \$80 000 |

After conference with the Chief of Ordnance, the Board has recommended the following modifications:

| | |
|---|----------|
| Caring for, preserving, using and operating the United States testing machine at Watertown Arsenal..... | \$15 000 |
| For the purchase and preparation of material for specimens and for tests of structural material..... | 15 000 |
| For machine to test tension and compression of materials in order to supplement the present machine, and for preserving and operating the same..... | 50 000 |
| | <hr/> |
| | \$80 000 |

It is also understood that should these appropriations be made by Congress, a fair proportion will be expended in tests to be made under the programme of this Society.

The Board, therefore, requests the members of the Society to advocate and support these appropriations by Congress with any influence they may possess, in preference to any other method of Congressional action.

For the Board of Direction,

JOHN BOGART,

Secretary.

MARCH 20TH, 1884.—Applications were considered. The committee appointed to prepare a design for a badge reported, presenting and recommending a design, which design was adopted by the Board. A committee was appointed to arrange for the manufacture of the badge. The preparation of a circular to members was directed, with reference to arrangements for purchase and distribution of the badges.

THE ROWLAND PRIZE.

CODE OF RULES FOR ITS AWARD.

Not more than one prize shall be awarded each year for papers presented during the year. The year shall terminate on the first day of August, and the award shall be announced at the annual meeting in January.

The prize shall consist of fifty dollars in cash.

The award shall be made by a committee consisting of the Secretary and two members of the Society, to be appointed by the Board of Direction.

The prize shall be awarded to such paper as the committee deem most worthy of such recognition, the preference being given to papers describing in detail accomplished works of construction, their cost and manner of execution, and the errors in design and execution.

THE NORMAN MEDAL.

CODE OF RULES FOR ITS AWARD.

I.—Competition for the Norman Medal of the American Society of Civil Engineers shall be restricted to members of the Society.

II.—There shall be one gold medal, and only one, struck for each and every fiscal year of the Society, and awarded as hereinafter provided. The dies therefor shall be with the Superintendent of the United States Mint at Philadelphia, in trust exclusively for the above purpose. Such medal shall be of a cost equal to the annual interest received upon \$1 000 of the Consolidated Stock of the City of New York, Certificate No. 179, of the additional new Croton Aqueduct Stock of the City of New York, authorized by an Act of the Legislature of the State of New York, Chap. 230, passed April 15th, 1870, dated November 17th, 1873, now held in trust by the Treasurer of this Society, and so held solely for this purpose, and shall be executed upon his order.

III.—All original papers presented to the Society by members of any class, during the year for which the medal is awarded, shall be open to the award, provided that such papers shall not have been previously contributed in whole or in part to any other association, nor have appeared in print prior to their publication by the Society, nor have been presented to the Society in any previous year.

IV.—The Board of Censors to award the medal shall consist of three members of the Society, to be designated by the Board of Direction. The Secretary of the Society shall act as Secretary to the Board of Censors.

V.—The medal shall be awarded to such paper as the said Board shall judge to be worthy of special commendation for its merits as a contribution to engineering science, not merely relatively as compared with others presented during the same year, but as exhibiting the science, talent or industry displayed in the consideration of the subject treated of, and for the good which may be expected to result from the discussion and the inquiry.

VI.—In case no paper presented during the year shall be deemed of sufficient value to receive an award, the amount of the interest of the fund for that year shall be expended by the Board of Direction in the purchase of books, to be offered as a premium for the second best paper in the next year in which more than one paper of sufficient value may be presented.

VII.—The medal year shall terminate on the first day of August, and the award shall be announced at the annual meeting.

VIII.—The Treasurer of this Society shall cause the medal to be prepared and delivered to, or deposited to the order of, the successful competitor, within two months after the annual meeting at which the same shall have been awarded.

American Society of Civil Engineers.

PROCEEDINGS.

Vol. X.—April, 1884.

MINUTES OF MEETINGS.

(Abstract of such as may be of general interest to members.)

OF THE SOCIETY.

APRIL 2D, 1884.—The Society met at 8 P. M., Vice-President W. H. Paine in the chair; John Bogart, Secretary. Ballots were canvassed and the following candidates declared elected: As Members—Thomas Williams Baldwin, Bangor, Me.; Thomas Ellis Brown (elected Junior November 3d, 1880), New York; Oren Beaumont Colton, Chicago, Ill.; Stewart Derbshire, Aylmer, Canada; Joshua Lathrop Gillespie (elected Junior February 3d, 1875), St. Paul, Minn.; Minard Lafever Holman, St. Louis, Mo.; William Tyndale Jennings, Toronto, Canada; Henry F. Juengst, St. Joseph, Mo.; Moritz Lassig, Chicago, Ill.; John Francis O'Rourke, New York; George W. Rafter, Fredonia, N. Y.; Irving Ariel Stearns, Wilkesbarre, Pa. As Juniors—Frank Edward Bissell, Sedalia, Mo.; Joseph Allen Powers, Lansingburgh, N. Y.; Commodore Perry Ruple, Wilsons Point, La.; William H. Starr, Buffalo, N. Y.

A paper by the late William R. Morley, M. Am. Soc. C. E., on "The Proper Compensation for Railroad Curves," previously read, was discussed by A. A. Robinson, William H. Searles, Lewis Kingman, A. M. Wellington, Edward P. North, Charles E. Emery and M. N. Forney.

APRIL 16TH, 1884.—The Society met at 8 P. M., President D. J. Whittemore in the chair; John Bogart, Secretary. A paper by Hamilton Smith, Jr., M. Am. Soc. C. E., on "The Temperature of Water at Various Depths in Lakes and Oceans," was read by the author and discussed by Messrs. Cooper, Croes, J. P. Davis, Dorsey, George S. Greene, Jr., R. L. Harris, Keith, North, Wellington and Hamilton Smith, Jr.

OF THE BOARD OF DIRECTION.

APRIL 2D, 1884.—Applications were considered. General business transacted.

APRIL 9TH, 1884.—Applications were considered.

APRIL 16TH, 1884.—Applications were considered. Action was taken as to Library. General business transacted.

APRIL 30TH, 1884.—Applications were considered. Action taken as to members in arrears. Appropriations were made. Action was taken as to Transactions and as to Library.

LIST OF MEMBERS.

ADDITIONS.

HONORARY MEMBERS.

Date of Election.

NEWTON, JOHN.....Chief of Engineers, Brig. and Bvt.
Maj.-Gen, U. S. A., Washington, D.
C.....Apl. 30, 1884.

MEMBERS.

BALDWIN, THOS. WILLIAMS...Room 1, Exchange Block, Bangor.Me.Apl. 2, 1884.
BROWN, THOMAS ELLIS, Jr...(Elected Junior Nov. 3, 1880), 337
West 34th street, New York City... " " "
COLTON, OREN BEAUMONT...243 State street, Chicago, Ill..... " " "
GILLESPIE, JOSHUA LATHROP.(Elected Junior Feb. 3, 1875), P. O.
Box 2127, St. Paul, Minn..... " " "
HOLMAN, MINARD LAFEVER..Water Commissioner's Office, City
Hall, St. Louis, Mo..... " " "
JENNINGS, WILLIAM TYNDALE.38 Stanley Crescent, Toronto, Canada. " " "
JUENGST, HENRY F.....Res. Engineer, St. Joseph Water Co.,
St. Joseph, Mo..... " " "
LASSIG, MORITZ.....53 Metropolitan Block, Chicago, Ill.. " " "
MARINDIN, HENRY LOUIS...Assistant U. S. Coast and Geodetic
Survey, 9 Pemberton square, Boston,
Mass.....May 7, 1884.
ODELL, FRED. SYLVESTER...Lawrenceville, N. J.....Mar. 5, 1884.
RAFTER, GEORGE W.....Engineer Fredonia Water Works, 32
City Hall, Rochester, N. Y.....Apl. 2, 1884.
STEARNS, IRVING ARIEL....Second National Bank Building,
Wilkesbarre, Pa..... " " "

JUNIORS.

| | | Date of Election. |
|------------------------|--|-------------------|
| BISSELL, FRANK EDWARD | Res. Engineer, Missouri, Kansas and Texas Div., Missouri Pacific Ry., Lock-box 344, Sedalia, Mo. | Apl. 2, 1884. |
| MAGOVERN, EDWARD E. | 22 Cortlandt street, New York City | Jan. 2, 1884. |
| POWERS, JOSEPH ALLEN | Lansingburgh, N. Y. | Apl. 2, 1884. |
| RUPLE, COMMODORE PERRY | U. S. Assistant Engineer, Wilson's Point, La. | " " " |
| STARR, WILLIAM H. | Roadmaster Buffalo and Rochester Div., New York, Lake Erie and Western R. R., Buffalo, N. Y. | " " " |

CHANGES AND CORRECTIONS.

MEMBERS.

| | |
|---------------------|--|
| BAKER, WILLIAM H. | Ass't Eng. Atchison, Topeka and Santa Fé R. R., San Marcial, N. M. |
| BISHOP, JUDSON W. | 155 East Fourth street, St. Paul, Minn. |
| BRIGGS, ROSWELL E. | Chief Engineer Mexican Central Ry., El Paso, Texas. |
| CAMPBELL, JOHN C. | Pres. North American Metaline Co., 4 Great Jones street, New York City. |
| CANFIELD, EDWARD. | Supt. Middle Div., New York, Ontario and Western Ry., Middletown, N. Y. |
| CORNELL, O. H. P. | Sea Cliff, Queens Co., N. Y. |
| CORTHELL, E. L. | Chief Engineer New York, West Shore and Buffalo Ry., 42d Street Ferry, N. R., New York City. |
| DICKINSON, P. P. | 7 Nassau street, Room 42, New York City. |
| FLAGG, J. FOSTER. | (Care Am. Soc. C. E.), 127 East 23d street, New York City. |
| FORCE, CYRUS G. | City Civil Engineer, Cleveland, Ohio. |
| FORSYTH, ROBERT. | (Care Spang Steel and Iron Co.), Pittsburgh, Pa. |
| GODWIN, BRYANT. | 51 Beekman street, New York City. |
| HIDER, ARTHUR. | U. S. Assistant Engineer, Wilsons Point, La. |
| KENNEDY, WILLIAM H. | Walla Walla, Washington Territory. |
| MCCOLLOM, THOMAS C. | Civil Engineer U. S. N., 1811 Lee street, Philadelphia, Pa. |
| MCLAIN, LOUIS R. | Maintenance of Way Engineer, South Florida R. R., Sanford, Florida. |
| MORSE, CHARLES J. | Morse Bridge Co., Youngstown, Ohio. |
| PERKINS, CHARLES P. | Real Estate Dept., Pennsylvania R. R., 233 South Fourth street, Philadelphia, Pa. |
| PROUT, HENRY G. | 16 Chambers street, New York City. |
| SAVAGE, ALBERT C. | Asst. Engineer Galveston, Harrisburg and San Antonio R. R., Houston, Texas. |

- SEARLES, WILLIAM H. Stamford, Conn.
 SEARS, CLINTON B. Capt. Corps of Engineers, U. S. A., in charge of
 3d District Mississippi River Improvements and
 Construction of Levees, Improving Harbor of
 Vicksburg, and Member of Levee Board, Vicks-
 burg, Miss,
 SITES, WILMON W. C. 8 Oakland avenue, Jersey City, N. J.
 SKILTON, GEORGE S. Chief Engineer and Genl. Supt. Sinaloa and Du-
 rango R. R., Culiacan, Mexico.
 SMITH, W. HARRISON. 408 South 41st street, Philadelphia, Pa.
 WARD, CHARLES D. 63 Bleecker street, New York City.
 WILLIAMSON, WM. GARNETT. City Engineer, Montgomery, Ala.
 WURTELE, ARTHUR S. C. 79 Niagara square, Buffalo, N. Y.

ASSOCIATE.

- BURR, WILLIAM H. Phoenix Bridge Co., Phoenixville, Pa.

JUNIOR.

- CORNELL, GEORGE B. (Care Chief Engineer New York, West Shore and
 Buffalo Ry.), 42d Street Ferry, N. R., New York
 City.

FELLOW.

- CASS, GEORGE W. 32 Nassau street, New York City.

American Society of Civil Engineers.

PROCEEDINGS.

Vol. X.—May, 1884.

MINUTES OF MEETINGS.

(Abstract of such as may be of general interest to members.)

OF THE SOCIETY.

MAY 7TH, 1884.—The Society met at 8 p. m., Vice-President William H. Paine in the chair; John Bogart, Secretary. Ballots were canvassed and the following candidates declared elected: As Members—Willis Dils Chapman, Akron, Ohio; John Eugene Cheney, Boston, Mass.; Arthur De Wint Foote, New York City; George Samuel Gatchell, Buffalo, New York; Henry Louis Marindin, Boston, Mass.; Evelyn Piereponte Roberts, Fort Hamilton, New York; Jesse Wager Walker, Pittsburgh, Pa. As Juniors—Henry Goldmark, New York City; Samuel C. Weiskopf, Milwaukee, Wis.; Herbert Andrew Young, Toledo, Ohio. The election was announced of General John Newton, Chief of Engineers, United States Army, as an Honorary Member of the Society.

A paper by James Christie, M. Am. Soc. C. E., on "The Strength and Elasticity of Structural Steel and its Efficiency in the form of Beams and Struts," was read. This paper and the one previously presented by the same writer on the Strength of Wrought-Iron Struts was discussed by Messrs. Onward Bates, A. P. Boller, G. Bouscaren, Theodore Cooper, E. B. Dorsey, C. E. Emery, E. A. Fuertes, G. H. Pegram, P. Roberts, Jr., C. C. Schneider, H. R. Towne, and J. Christie.

MAY 21ST, 1884.—The Society met at 8 p. m., Vice-President William H. Paine in the chair; John Bogart, Secretary.

A description of a Permanent Transmitting Dynamometer, by the late Charles A. Smith, M. Am. Soc. C. E., was read by the Secretary.

The subjects of the Temperature of Water at various Depths, and of the Variations of Temperature in the Earth at Great Depths, were

discussed by Messrs. E. B. Dorsey, Hamilton Smith, Jr., and D. J. Whittemore.

A description of a peculiar slide which recently occurred near Dover, N. H., was given by Mr. Theodore Cooper.

OF THE BOARD OF DIRECTION.

MAY 7TH, 1884.—Applications were considered. Arrangements for the approaching Convention were discussed. Communications in reference to the Society badge were considered. General business was transacted.

MAY 21ST, 1884.—Financial business was transacted. Under the provisions of the By-Laws, it was directed that there should be no meeting of the Society during the months of July and August. Communications in reference to the Society badge were considered. Arrangements for the Convention were made.

THE NORMAN MEDAL.

CODE OF RULES FOR ITS AWARD.

I.—Competition for the Norman Medal of the American Society of Civil Engineers shall be restricted to members of the Society.

II.—There shall be one gold medal, and only one, struck for each and every fiscal year of the Society, and awarded as hereinafter provided. The dies therefor shall be with the Superintendent of the United States Mint at Philadelphia, in trust exclusively for the above purpose. Such medal shall be of a cost equal to the annual interest received upon \$1 000 of the Consolidated Stock of the City of New York, Certificate No. 179, of the additional new Croton Aqueduct Stock of the City of New York, authorized by an Act of the Legislature of the State of New York, Chap. 230, passed April 15th, 1870, dated November 17th, 1873, now held in trust by the Treasurer of this Society, and so held solely for this purpose, and shall be executed upon his order.

III.—All original papers presented to the Society by members of any class, during the year for which the medal is awarded, shall be open to the award, provided that such papers shall not have been previously contributed in whole or in part to any other association, nor have appeared in print prior to their publication by the Society, nor have been presented to the Society in any previous year.

IV.—The Board of Censors to award the medal shall consist of three members of the Society, to be designated by the Board of Direction. The Secretary of the Society shall act as Secretary to the Board of Censors.

V.—The medal shall be awarded to such paper as the said Board shall judge to be worthy of special commendation for its merits as a contribution to engineering science, not merely relatively as compared with others presented during the same year, but as exhibiting the science, talent or industry displayed in the consideration of the subject treated of, and for the good which may be expected to result from the discussion and the inquiry.

VI.—In case no paper presented during the year shall be deemed of sufficient value to receive an award, the amount of the interest of the fund for that year shall be expended by the Board of Direction in the purchase of books, to be offered as a premium for the second best paper in the next year in which more than one paper of sufficient value may be presented.

VII.—The medal year shall terminate on the first day of August, and the award shall be announced at the annual meeting.

VIII.—The Treasurer of this Society shall cause the medal to be prepared and delivered to, or deposited to the order of, the successful competitor, within two months after the annual meeting at which the same shall have been awarded.

THE ROWLAND PRIZE.

CODE OF RULES FOR ITS AWARD.

Not more than one prize shall be awarded each year for papers presented during the year. The year shall terminate on the first day of August, and the award shall be announced at the annual meeting in January.

The prize shall consist of fifty dollars in cash.

The award shall be made by a committee consisting of the Secretary and two members of the Society, to be appointed by the Board of Direction.

The prize shall be awarded to such paper as the committee deem most worthy of such recognition, the preference being given to papers describing in detail accomplished works of construction, their cost and manner of execution, and the errors in design and execution.

LIST OF MEMBERS.

ADDITIONS.

MEMBERS.

Date of Election.

ALLEN, JAMES PIERSON... (Elected Junior March 5, 1879), 50 St.
Philip street, Charleston, S. C. June 4, 1884.

| | Date of Election. |
|--|-------------------|
| BELL, HENRY PURDON .. Canchon Block, Winnipeg, Manitoba. | June 4, 1884. |
| BIDDLE, WILLIAM FOSTER 209 South 3d street, Philadelphia, Pa. | " " " |
| CHAPMAN, WILLIS DILS...Akron, Ohio..... | " " " |
| CHENEY, JOHN EUGENE...City Engineer's office, Boston, Mass.... | " " " |
| CURTIS, WENDELL RHODES.(Elected Junior March 3, 1875), P. O. Box 133, Savannah, Ga..... | " " " |
| DERBISHIRE, STEWART....Assistant Engineer, Pontiac Pacific Junction Ry., Aylmer, Canada..... | April 2, 1884. |
| FOOTE, ARTHUR DE WINT.Boisé City, Idaho..... | May 7, 1884. |
| GATCHELL, GEO. SAMUEL..Gen. Supt., Buffalo, New York and Philadelphia R. R., Buffalo, N. Y.... | " " " |
| IVES, CHAUNCEY.....Chief Engineer Cumberland Valley R. R., Chambersburg, Pa..... | June 4, 1884. |
| MOULTON, MACE.....Prin. Asst. Engineer, Bridges and Buildings, Edgmoor Iron Co., Wil- mington, Delaware..... | " " " |
| O'ROURKE, JOHN FRANCIS.P. O. Box 561, Stillwater, Minn..... | April 2, 1884. |
| REA, SAMUEL.....Prin. Asst. Engineer of Construction, Pennsylvania R. R., Philadelphia, Pa. | June 4, 1884. |
| ROBERTS, PERCIVAL, JR....(Elected Associate May 7, 1879), 265 South 4th street, Philadelphia, Pa.... | " " " |
| WALKER, JESSE WAGER...Sup't Shiffler Bridge Works, Pittsburgh, Pa..... | May 7, 1884. |
| WHEELER, LEVI LOCKWOOD.U. S. Assistant Engineer, 2828 Washing- ton avenue, St. Louis, Mo..... | June 4, 1884. |

ASSOCIATES.

| | |
|---|---------------|
| HARDWICKE, ALAN HYDE | |
| GARDNER.....Buffalo, N. Y..... | June 4, 1884. |
| ROBERTS, WILLIAM.....Waltham, Mass..... | " " " |

JUNIORS.

| | |
|--|---------------|
| BREITHAUP, WM. HENRY.Berlin, Ontario, Canada..... | June 4, 1884. |
| CONOVER, ALLAN DARST...Madison, Wis..... | " " " |
| GAY, MARTIN.....West New Brighton, Richmond Co., N. Y..... | " " " |
| GOLDMARK, HENRY.....109 East 71st street, New York City... | May 7, 1884. |
| RUSSELL, SILAS BENT....Assistant Engineer to Water Commis- sioner, St. Louis, Mo..... | June 4, 1884. |
| STARR, CHANDLER DANNAT.Croton Aqueduct Commissioners' office, Yonkers, N. Y..... | " " " |
| WEISKOPF, SAMUEL C....Asst. Engineer, Chicago, Milwaukee and St. Paul Ry., Milwaukee, Wis..... | May 7, 1884. |
| YOUNG, HERBERT ANDREW.Asst. Engineer, Toledo, Cincinnati and St. Louis R. R., Toledo, Ohio..... | " " " |

American Society of Civil Engineers.

PROCEEDINGS.

Vol. X.—June, 1884.

MINUTES OF MEETINGS.

(Abstract of such as may be of general interest to members.)

ANNUAL CONVENTION OF THE SOCIETY.

HELD IN THE CITY OF BUFFALO, NEW YORK, ON THE 10TH, 11TH, 12TH AND
13TH OF JUNE, 1884.

FIRST SESSION.

TUESDAY, JUNE 10TH, 1884, 10 A. M.—The Convention met at the Hall of the Young Men's Christian Association Building, and was called to order by JOHN BOGART, Secretary Am. Soc. C. E., as follows :

GENTLEMEN: I am requested to call the Convention of the American Society of Civil Engineers for 1884 to order, and to introduce Mr. D. J. WHITTEMORE, the President of the Society.

DON J. WHITTEMORE, President Am. Soc. C. E.—Gentlemen : In accordance with a very proper by-law of our organization, it now becomes necessary to select from among our membership one, who is not an officer of this Society, who shall preside at all of the meetings of this Convention, except the meeting for business. It has been customary in former years to have the nomination of this officer made by the Local Committee, at the place at which the Convention is held. I would therefore ask the Secretary if such nomination has been made, and if so, to report.

JOHN BOGART, Secretary Am. Soc. C. E.—Mr. President : I am requested by the Local Committee to nominate as the presiding officer of

the Convention Mr. T. GUILFORD SMITH, member of the Society, and a resident of the City of Buffalo.

The President put the question to the Convention on the nomination of Mr. T. Guilford Smith to preside over the deliberations of the Convention, which was unanimously decided in the affirmative.

The President then introduced Mr. T. GUILFORD SMITH.

T. GUILFORD SMITH, Chairman.—Gentlemen: I do not think it is necessary for me to make any formal remarks on this occasion. The Convention will please come to order. The Secretary will read the order of business, and such other notices as are necessary and proper to be made.

The Secretary then read the list of papers to be presented, and announced the details of the programme for the week.

JAMES B. FRANCIS, Past-President Am. Soc. C. E., then presented a paper, subject, "Experiments on the Flow of Water over Submerged Weirs," and also a paper, subject, "Experiments on the Humphrey Turbine Water Wheel at the Tremont and Suffolk Mills in Lowell, Mass."

A. M. WELLINGTON, M. Am. Soc. C. E., then presented a paper upon "The American Line from Vera Cruz to the City of Mexico, with Notes of some other Lines from the Coast to the Plateau." The paper was not read in full, but, by request, Mr. Wellington gave a summary of its contents.

P. C. ASSERSON, M. Am. Soc. C. E., then read a paper, "Statement of the Results of a few Experiments to Prevent the Ravages of the 'Teredo Navalis,'" which was discussed by Messrs. J. P. Card, Edward R. Andrews, Charles B. Brush, Edward P. North, M. M. Tidd, C. G. Force, Jr., J. Foster Flagg, J. Albert Monroe, H. W. Brinkerhoff, William E. Worthen, H. Manley, Robert Gordon, Charles Latimer and P. C. Asserson.

ROBERT MOORE, M. Am. Soc. C. E., then read a paper, subject, "Landing Arrangements for Car Ferry on the Mississippi River."

SECOND SESSION.

TUESDAY, JUNE 10TH, 1884.—The meeting of the Convention was resumed at fifteen o'clock (three P. M.); GEORGE S. FIELD, M. Am. Soc. C. E., was temporarily called to the Chair; subsequently the Chair was taken by Chairman T. GUILFORD SMITH.

On motion, the time for the business meeting was fixed at seventeen o'clock (five P. M.), of this afternoon.

D. FITZGERALD, C. E., then presented a paper, subject, "Analysis of the Rainfall at Lake Cochituate, Mass.," which was discussed by Messrs. R. Fletcher, C. Herschel, Robert Moore, N. M. Edwards and D. Fitzgerald.

BENJAMIN RHODES, M. Am. Soc. C. E., then read a paper, subject, "Application of the Water Power of Niagara to Electricity," which was discussed by Messrs. E. B. Dorsey, J. B. Francis and B. Rhodes.

O. E. MICHAELIS, M. Am. Soc. C. E., then read a paper, subject, "The Heavy Gun Question."

The hour for the business meeting having arrived, the discussion upon this paper was postponed. The business meeting was then held, the report of which will be found in a subsequent page of these Proceedings.

At the conclusion of the business meeting the Convention took a recess.

THIRD SESSION.

TUESDAY, JUNE 10TH, 1884.—The meeting of the Convention was resumed at twenty o'clock (eight P. M.), as a public meeting, in accordance with the By-Laws, T. GUILFORD SMITH, M. Am. Soc. C. E., in the Chair.

The Chairman stated that, the Mayor being absent from the city, the address of welcome would be made by R. R. Hefford, Esq., President of the Common Council. The Chairman also presented the following letter from E. L. Hedstrom, Esq., President of the Merchants' Exchange :

MR. T. GUILFORD SMITH, Chairman:

MY DEAR SIR,—On my arrival in the city to-day at noon, I find my physical condition to be such that it seems prudent for me to remain at home this afternoon and evening.

I sincerely regret this indisposition, and were I to allow my inclination to overcome my prudence I should do myself harm and your Society an injustice by attempting to address you to-night. I congratulate you and the citizens of Buffalo that it has become possible for us to extend our hearty greetings and welcome to our city and homes to such a large body of scientific gentlemen, who compose the American Society of Civil Engineers.

Kindly convey my regrets of inability to be present at the reception, and greatly oblige

Yours most sincerely,

E. L. HEDSTROM.

717 Delaware Avenue, Buffalo, June 10th, 1884.

The Chairman then introduced Alderman R. R. Hefford, President of the Common Council, who spoke as follows :

MR. PRESIDENT, LADIES AND GENTLEMEN: Whoever is permitted to give free greeting to such an eminent body should, indeed, have something worthy—something wise to say. I have to regret that the privilege of welcoming you to our city had not fallen to the lot of one better able to express to you that warmth of hospitable feeling which I know our citizens entertain toward your Society, and which I trust you will feel ere you turn your faces homeward.

Looking back over the political and commercial history of our country, and of the advancement of our people in things material, and seeing upon it all the imprint of the master mind of the American engineer, we can but feel honored in being permitted to offer you entertainment at this time.

In that great struggle of our forefathers for independence we find the central figure, the great captain that led them to victory, known to the world as an honored member of your profession, and in every conflict since that day we have seen members of your profession taking an active and leading part. History teaches us that in all ages man's principal avenues of trade and travel have been along the parallels of latitude from East to West and from West to East. When the white man undertook to open up this great continent to the commerce of the world, and to develop lines of communication between the East and the far West, he was met by awe-inspiring barriers of nature running North and South, in the form of lofty mountain ranges, deep valleys and mighty rivers. But owing to the genius of that pioneer of trade and commerce, the American engineer, who pierced the mountain, bridged the valley and the stream, and made straight the way for the great iron highways of commerce; these barriers, formidable as they were, were not permitted to obstruct the tread of man toward the setting sun, or to prevent the adding of one more link to the tie that binds the States in union. But, Mr. President, our State, as well as the nation, is indebted to your profession for many of its features of prosperity. The traveler entering the harbor of our metropolis, is met on every hand with the evidences of the skill of our civil engineers, and as he nears the city there opens up to him a view of that grand structure of grace and beauty, the East River Bridge, which is to stand for ages a monument to the genius of the American engineer; and should the traveler desire to meet with you here, there are open to him six iron arteries of trade, which invite him to the luxury of modern railroad travel, and parallel to these lines of travel, and to which we would call his attention, is that most useful, but somewhat aged, example of handiwork of the American engineer, the Erie Canal, a work which has returned its builders over forty million dollars more than it cost, and made this State what she is—the Empire State of the Union. Its commerce laid well the foundations of as thriving a lot of cities and towns along its banks as the sun is permitted to shine upon, and all this was accomplished before its rivals had laid a rail or passed a dividend. A fear has been expressed, Mr. President, that this grand old water-way would, by the dust of competition, be dried up, but the people of this State have determined that her waters shall moisten the lips of commerce for a while longer, and her gates be thrown open as a free highway to the commerce of the world.

We would be pleased, while you are here, to show you our harbor, located upon a stream that, at one time, was fordable, and on which the early settlers concluded a harbor could not be built, but the hand of science solved the question, and by the judicious placing of a break-water and pier, one of the finest harbors on the great lakes has been constructed, thereby enabling us to attain an enviable position among the cities of the world as a grain-receiving and coal-shipping port.

We shall also be able to show you in this vicinity some results in the science of engineering and bridge building, in which we have a local pride, and in which we are ready to join with your Society in congratulating those of our number who were instrumental in bringing about the accomplished fact. As you pass through our city and observe our streets and parks, the extent of our railroads and manufacturing interests, it will be apparent to you that the American engineer has not been idle in this part of the country, but rather that he has done his full share toward placing the country at large, and this community in particular, under lasting obligation to the profession so honorably represented by your Society.

A short time since I had the pleasure of joining, with others, in a letter extending an invitation to your Society to hold its annual meeting in this city. I now desire, in person, to thank you for your favorable response to that invitation, and on behalf of the municipal government of our city to extend to you, Mr. President, and through you to each member of your Society, the hand of greeting and assurance of a sincere and cordial welcome to the city.

D. J. WHITTEMORE, President Am. Soc. C. E., responded as follows:—Sir: Aristippus, the Socratic philosopher, when thrown on the coast of Rhodes by shipwreck, perceiving geometrical diagrams thereon, exclaimed to his disheartened companions: "Be of good cheer, I see marks of civilization." Guided by them, he made his way straight to the city of Rhodes, where, by his great learning, he secured not only honors for himself, but food and raiment for his companions. So impressed was he of the value of knowledge that he bade his companions, on their return home, to secure for themselves and their children those possessions that neither the changes of fortune nor devastation of war could injure.

Not by disaster, but in quest of knowledge and through the fame of your fair city for its many objects of great interest to the civil engineer, we have come among you to hold our Annual Convention, and find on every hand more than geometrical diagrams that attest the industry and intelligence of your citizens, marks of civilization that have rendered this locality famous throughout our continent, works of the civil engineer, designed for the comfort, convenience and commercial prosperity of your people. We also recognize that we are at the place where terminated one of the great works of the early American engineer, the building of which was fostered by, and which, since its completion, has been maintained by your great Commonwealth, and from which all in the States of the West have received substantial benefit. We also recognize that here and in this proximity are to be found some of the noblest examples of modern engineering.

Words fail me in attempting to acknowledge to its full extent our appreciation of your kind and eloquent expressions toward the profession

we have the honor to follow ; your kind greeting and hearty welcome shall find a pleasant resting place in our hearts until long after this Convention shall have become a circumstance of the past—as long as memory remains to us—and we shall cherish the hope that in the future, through increased knowledge and experience, we may, as a profession, more fully merit that regard you have so generously accorded us to-night.

The President of the Society then made the annual address, which is printed in the current Transactions.

FOURTH SESSION.

FRIDAY, JUNE 13TH, 1884.—The meeting of the Convention was resumed at half-past nine in the morning, T. GUILFORD SMITH, M. Am. Soc. C. E., in the chair.

CHARLES LATIMER, M. Am. Soc. C. E., offered the following resolution : That the Society go into a business session for ten minutes in reference to the action taken upon the subject of "Standard Time." The motion being seconded, was put to vote and carried.

A business session was then held. The report of this session is included in the report of the business meeting.

At the close of the business session, the meeting of the Convention was resumed, T. GUILFORD SMITH, M. Am. Soc. C. E., in the chair.

E. L. CORTHELL, M. Am. Soc. C. E., then presented a paper, subject, "The South Pass Jetties; Ten Years' Practical Teachings in River Hydraulics."

BENJAMIN REECE, M. Am. Soc. C. E., then read a paper, subject, "The Management of Forces Engaged in Railway Track Repairs," which was discussed by Mr. Charles Latimer.

A paper by E. SWEET, Jr., M. Am. Soc. C. E., subject, "The Radical Enlargement of the Artificial Water-way Connecting the Lakes and the Hudson River," was, in the absence of the writer, read by the Secretary.

A paper by M. M. DRAKE, of Buffalo, subject, "Our Lake Marine," was, in the absence of the writer, read by the Secretary.

The subjects presented by the two last named papers were discussed by Messrs. T. C. Clarke, James B. Francis, William J. McAlpine, Charles Latimer, James H. Harlow, N. M. Edwards and Edward P. North.

Mr. F. COPE WHITEHOUSE, then, by invitation, described the results of his examinations of the site of the great lake which formerly existed in connection with the valley of the Nile.

FIFTH SESSION.

FRIDAY, JUNE 13TH, 1884.—The meeting of the Convention was resumed at fourteen and one-half o'clock (2:30 P. M.), Past President JULIUS W. ADAMS in the chair.

CLEMENS HERSCHEL, M. Am. Soc. C. E., read a discussion on "The Cost of Steam Power." The subject was discussed by Messrs. James B. Francis, William J. McAlpine and C. Herschel.

J. JAMES R. CROES, M. Am. Soc. C. E., then presented a paper, subject, "Water Rates," which subject was discussed by Messrs. William J. McAlpine, Charles B. Brush, Henry Manley, B. S. Church and J. James R. Croes.

A paper by E. B. DORSEY, subject, "Experiments on Structural Steel," was, in the absence of the author, read by the Secretary.

This paper, and the paper previously read by O. E. Michaelis, M. Am. Soc. C. E., on "The Heavy Gun Question," and the paper by James Christie, M. Am. Soc. C. E., on "The Strength and Elasticity of Structural Steel, and its efficiency in the form of Beams and Struts," were discussed by Messrs. William J. McAlpine, James Christie, J. F. Holloway, Percival Roberts, Jr., and O. E. Michaelis.

The following papers were presented and read by title, or by short summary :

The Rectification of the Missouri River at Bismarck Bridge: GEORGE S. MORISON, M. Am. Soc. C. E.

Substructure as an Engineering Problem: J. ALBERT MONROE, M. Am. Soc. C. E.

Concentration of Flood Waters and Mississippi Levees Tested by Facts: R. E. McMATH, M. Am. Soc. C. E.

Co-operation between the General and State Governments in making Topographical Surveys: H. F. WALLING, M. Am. Soc. C. E.

The Wear of Pins; some data from experience on the Metropolitan Elevated Railroad: A. P. BOLLER, M. Am. Soc. C. E.

Formula for the Weights of Iron and Steel Railway Bridges under Standard Specifications: G. H. PEGRAM, M. Am. Soc. C. E.

Timber Lands of the Northwest and of British Columbia: H. C. PUTNAM.

Car Mileage on American and Foreign Railroads: E. YARDLEY, M. Am. Soc. C. E.

An Apparent Welding of Steel by Friction: WILLIAM H. GRANT, M. Am. Soc. C. E.

Steam Units: CHARLES E. EMERY.

The following resolution was adopted:

Resolved, That the thanks of the American Society of Civil Engineers, in Convention assembled, are hereby tendered to the citizens of Buffalo in recognition of the invitation to hold this Convention in their beautiful

and interesting city, and also in recognition of the earnest efforts that have been made to render pleasant this visit of the members of the Society; also that the thanks of the Society are especially given to the committees which have so well taken care of the many details, the perfection of which has contributed so greatly to the success of the Convention.

Resolved, That the Convention recognizes and appreciates the work that has been so thoroughly done by the members of the Society resident at Buffalo.

Resolved, That the thanks of the Society are tendered to the officers of the New York, Lake Erie and Western Railroad, the New York Central and Hudson River Railroad, the Buffalo, New York and Philadelphia Railroad, the Buffalo Creek Railroad, and the other railways which have provided facilities and accommodation for the comfort and convenience of the Convention.

Resolved, That the thanks of the Society, in Convention assembled, are extended to the officers of the New York, West Shore and Buffalo Railway, and the New York, Ontario and Western Railway, for the courtesies extended, for the accommodation afforded by the special train for the trip from New York to Buffalo and return, and for the opportunity of traveling over that interesting route.

Resolved, That the thanks of the Society be particularly tendered to Mr. E. L. Corthell, M. Am. Soc. C. E., Chief Engineer New York, West Shore and Buffalo Railway, for the successful undertaking and management of that delightful excursion.

ROBERT GORDON, M. Am. Soc. C. E., presented a verbal description of the new steamship *America*, of the National Line, illustrated by drawings. On motion, Mr. Gordon was requested to prepare a paper on the subject for the Transactions.

The Convention then adjourned.

The following (209) members were in attendance at the Convention : A. V. Abbott, Julius W. Adams, James H. Armington, Brooklyn, W. M. Allaire, Edward R. Andrews, New York City, N. Y.; James Archbald, Scranton, Pa.; P. C. Asserson, Norfolk, Va.; Thomas W. Baldwin, Bangor, Me.; Fred. Brooks, Boston, H. Bissell, Salem, Mass.; John W. Bacon, Danbury, George H. Bishop, Middletown, William W. Bonnett, Waterbury, Conn.; A. P. Barnard, Oliver W. Barnes, H. D. Blunden, John Bogart, Alfred P. Boller, Henry R. Bradbury, Thomas E. Brown, Jr., New York City, H. W. Brinckerhoff, Brooklyn, N. Y.; Charles B. Brush, Hoboken, N. J.; Charles E. Billin, George Burnham, Jr., Philadelphia, A. Bonzano, Phoenixville, Arthur Beardsley, Swarthmore, Pa.; W. L. Baker, Detroit, Mich.; Max J. Becker, Columbus, Ohio; M. S. Belknap, Montgomery, Ala.; W. R. Belknap, Louisville, Ky.; Henry I. Bliss, La Crosse, Wis.; Josiah G. Chase, Cambridgeport, Mass.; Frank A. Calkins, B. S. Church, Thomas C. Clarke, Alfred G. Compton, Theodore Cooper, E. L. Corthell, J. James R. Croes, New

York City; Martin Coryell, Lambertville, N. J.; William B. Coffin, Hornellsville, C. L. Crandall, Ithaca, N. Y.; James Christie, Pencoyd, F. H. Clement, Everett, Pa.; O. B. Colton, Chicago, Ill.; Joseph P. Card, St. Louis, Mo.; Joseph P. Davis, P. P. Dickinson, Edward B. Dorsey, C. Wheeler Durham, New York City; Charles G. Darrach, Ridley Park, Frank G. Darlington, Pittsburgh, Pa.; Frank C. Doran, Richmond, Ind.; Charles E. L. B. Davis, Detroit, Mich.; Chester B. Davis, Chicago, Ill.; W. A. G. Emonts, Philadelphia, Pa.; N. M. Edwards, Appleton, Wis.; J. T. Fanning, Manchester, Robert Fletcher, Hanover, N. H.; Edward A. Flint, Joseph P. Frizell, Frank L. Fuller, Boston, James B. Francis, Lowell, Mass.; Henry N. Francis, Providence, R. I.; Charles A. Ferry, New Haven, Conn.; John W. Ferguson, J. Foster Flagg, New York City; Charles H. Fisher, Albany, N. Y.; George B. Francis, Weehawken, Clark Fisher, Trenton, N. J.; Charles E. Fogg, Poughkeepsie, E. A. Fuertes, Ithaca, George S. Field, Samuel J. Fields, Buffalo, N. Y.; Sandford Fleming, Ottawa, Canada; C. G. Force, Cleveland, Ohio; James L. Frazier, Louisville, Ky.; Bryant Godwin, John C. Goodridge, Jr., New York City; Fred. Graff, Philadelphia, Pa.; George S. Gatchell, Buffalo, N. Y.; Charles E. Goad, Montreal, Canada; Charles E. Greene, Ann Arbor, Mich.; J. L. Gillespie, St. Paul, Minn.; Robert Gordon, British Burma, India; Clemens Herschel, Holyoke, Richard A. Hale, Lawrence, Mass.; Albert B. Hill, New Haven, Conn.; Stephen S. Haight, West Farms, C. M. Harris, Bentley D. Hasell, William J. Haskins, Charles W. Hunt, William R. Hutton, New York City, W. W. Hegeman, Rhinebeck, William E. Hoyt, Rochester, A. H. G. Hardwicke, W. A. Haven, Edmund Hayes, Buffalo, N. Y.; Rudolph Hering, Philadelphia, James H. Harlow, Pittsburgh, Pa.; W. M. Hughes, Cleveland, Ohio; F. B. Howard, Detroit, Mich.; S. A. Harrison, Milwaukee, Wis.; W. H. Jennings, Columbus, Ohio; H. F. Juengst, St. Joseph, Mo.; Walter Katté, New York City, T. P. Kinsley, Le Roy, Louis H. Knapp, Buffalo, N. Y.; E. H. Keating, Halifax, N. S.; Thomas C. Keefer, Ottawa, Canada; Marvin W. Kingsley, Cleveland, Ohio; William B. Knight, Kansas City, Mo.; Edward C. Kinney, Des Moines, Iowa; Augustus W. Locke, North Adams, Mass.; F. C. Lowthorp, Trenton, N. J.; Charles Latimer, Cleveland, Thomas D. Lovett, Cincinnati, Ohio; William H. Lotz, Chicago, Ill.; Charles F. Loweth, St. Paul, Minn.; Henry Manley, Boston, Mass.; J. Albert Monroe, Providence, R. I.; T. H. McKenzie, Southington, Conn.; Charles Macdonald, T. C. McCollom, George S. Morison, New York City, C. C. Martin, George W. McNulty, Brooklyn, William J. McAlpine, Bay Ridge, N. Y.; David E. McComb, A. G. Menocal, Washington, D. C.; O. E. Michaelis, Philadelphia, Frederick Mercur, Wilkesbarre, C. S. Maurice, Athens, Pa.; Henry G. Morse, Youngstown, B. F. Morse, Cleveland, Ohio; M. W. Mansfield, Richmond, Ind.; John MacLeod, Louisville, Ky.; W. H. McClintock, Louisville, Ky.; Robert

E. McMath, Robert Moore, St. Louis, Mo.; George A. Marr, St. Paul, Minn.; Edward P. North, F. O. Norton, New York City, Ellis B. Noyes, Brooklyn, Charles Neilson, Buffalo, N. Y.; James Owen, Newark, N. J.; L. F. Olney, Middletown, N. Y.; John A. Ockerson, St. Louis, Mo.; Edward S. Philbrick, Boston, Mass.; A. B. Paine, New York City, R. G. Packard, Brooklyn, N. Y.; George H. Pegram, Wilmington, Del.; Willard S. Pope, Detroit, Mich.; George W. Polk, San Antonio, Texas; George S. Rice, Georgetown, Colorado; Joseph R. Richards, Boston, William Roberts, Waltham, Mass.; R. P. Rothwell, New York City; G. M. Rusling, Hackettstown, N. J.; David Reeves, Percival Roberts, Jr., Philadelphia, Pa.; James L. Randolph, Baltimore, Md.; W. N. Radenhurst, George W. Rafter, Rochester, H. A. Richmond, B. C. Rumsey, Buffalo, Benjamin Rhodes, Niagara Falls, N. Y.; Benjamin Reece, Toledo, Ohio; George F. Swain, Boston, Mass.; C. C. Schneider, D. McN. Stauffer, New York City; J. H. Staats, Robert P. Staats, Jersey City, N. J.; W. Harrison Smith, Philadelphia, Pa.; Frank S. Stevens, Syracuse, T. Guilford Smith, W. H. Starr, Buffalo, N. Y.; Robert Surtees, Ottawa, Canada; C. H. Strong, Cleveland, William H. Searles, Elyria, Ohio; Charles L. Strobel, Pittsburgh, Pa.; Robert A. Shailer, Milwaukee, Wis.; M. M. Tidd, Boston, Mass.; Stevenson Towle, A. W. Trotter, New York City; A. J. Tullock, Leavenworth, Kansas; Edgar B. Van Winkle, New York City; John G. Van Horne, Jersey City, N. J.; William Watson, Boston, Joseph Whitney, Cambridgeport, Henry F. Walling, Pittsfield, Mass.; Edmund B. Weston, Providence, R. I.; William W. Wilson, Yonkers, Charles D. Watkins, A. M. Wellington, W. H. Wiley, W. E. Worthen, New York City; Squire Whipple, Albany, A. S. C. Wurtele, Buffalo, N. Y.; Charles D. Ward, Lebbeus B. Ward, Jersey City, N. J.; John A. Wilson, Philadelphia, Pa.; Herbert M. Wilson, Washington, D. C.; S. Whinery, Somerset, Ky.; L. L. Wheeler, Thomas J. Whitman, St. Louis, Mo.; D. J. Whitemore, Milwaukee, Wis.; and Herbert A. Young, Toledo, Ohio.

Note.—One hundred and fifteen ladies of the families of members accompanied them on the occasion of this Convention.

The arrangements for the Convention were in charge of the following committees of citizens of Buffalo:

Committee on Reception: His Honor the Mayor, Mr. JONATHAN SCOVILLE; the President of the Common Council, Mr. R. R. HEFFORD; the President of the Merchants' Exchange, Mr. E. L. HEDSTROM.

Committee on Entertainment: Mr. Franklin D. Locke, Mr. Henry W. Box, Gen. George S. Field, Mr. Josiah Jewett, Mr. John F. Moulton, Mr. Henry A. Richmond, Mr. E. C. Sprague, Mr. W. S. Bissell, Dr. Charles Cary, Mr. S. S. Guthrie, Mr. D. H. McMillan, Mr. E. H. Mavins, Mr. B. C. Rumsey, Mr. Wm. Thurstone, and Hon. R. C. Titus.

Committee on Printing : Mr. James N. Matthews, Mr. Charles W. McCune, and Mr. James D. Warren.

Committee on Transportation : Mr. W. S. Baldwin, Mr. F. E. Merrill, Mr. W. H. Perry, Mr. J. S. Bartlett, Mr. J. A. Burch, Mr. R. H. Noble, and Mr. Peter C. Doyle.

The details of the management were in charge of the following Committee of Members of the Society, resident in Buffalo:

Gen. GEORGE S. FIELD, *Chairman*; Mr. S. J. Fields, Mr. George S. Gatchell, Mr. William A. Haven, Mr. Edmund Hayes, Mr. Louis H. Knapp, Mr. Charles Neilson, Mr. Henry A. Richmond, Mr. B. C. Rumsey, Mr. Edward S. Safford, Mr. William H. Starr, Mr. T. GUILFORD SMITH, *Secretary*.

The meetings of the Convention were held in the hall of the Young Men's Christian Association. On Wednesday visits were made to the works of the Union Bridge Company, where bridge construction was in active progress. The harbor improvements and extensions now in progress at the Tift Farm property of the Lehigh Valley Railroad Company were next visited. These will include, when completed, 9 miles of docks and 4½ miles of canals, 200 feet wide and 16 feet deep; 15 miles of railroad tracks; 4500 feet of coal-stocking trestles with a storage capacity of 110000 tons, and 1800 feet of shipping pockets. Visits were made to the coal trestles and loading tunnels underneath. The anthracite coal chutes were also visited, and the operation of loading vessels witnessed. The works for shore protection were examined. This protection is effected by the use of fascine mattresses, as practiced in Holland. A visit was also made to the iron ship works, where lake vessels were in progress of construction. The trip was principally over the tracks of the Buffalo Creek Railroad and the New York, Lake Erie and Western Railroad. The harbor works were also examined from the yacht of Mr. J. McIntyre. An inspection was also made of the large trunk sewer at various points of its construction. During the afternoon and evening of the same day an excursion was made by steamer down the Niagara River to the house and grounds of the Falconwood Club, at Grand Island, where a collation was provided, after which the party returned to Buffalo. On Thursday a visit was made to Suspension Bridge and Niagara Falls. Ample time was given for an inspection of the new Cantilever Bridge, and also the Suspension Bridge. Dinner was provided at Niagara Falls. On Thursday evening a reception at the Buffalo Club was given by citizens of Buffalo to the members of the Society and guests. During Friday afternoon a visit was made by a number of members to the city water works and pumping station. On Friday evening the members of the Society gave a reception at the Genesee House to the gentlemen of Buffalo who had been connected with the arrangements for the Convention.

A unique and beautiful souvenir of the Convention was presented

to each member in attendance. This was a volume entitled "Some Things in and about Buffalo. A Souvenir of the Annual Convention of the American Society of Civil Engineers, held at Buffalo, N. Y., June 10-13, 1884." The book is printed in colors on heavy paper, and is illustrated by photographic reproductions of views of a number of interesting buildings and places. The cover is illuminated, and the book is in all respects artistic and appropriate. It was compiled, under direction of the Committee of Resident Members, by Mr. William Thurstone, Secretary of the Buffalo Merchants' Exchange. It was published by Messrs. Matthews, Northrup & Co.

Maps of Buffalo were provided, and also pamphlets written by Mr. Thurstone, and presented to members by his courtesy, describing the commercial, industrial and other features of the city. The use of the reading and writing rooms of the Young Men's Christian Association, the building in which the meetings were held, was tendered to the members of the Society by the Trustees of the Association. An invitation to visit the Merchants' Exchange was also received and accepted.

By invitation of the Buffalo, New York and Philadelphia, and the New York, Lake Erie and Western Railroads, a visit was made by a number of members and guests to Chatauqua Lake.

As will be seen by the accompanying letter from E. L. Corthell, Esq., M. Am. Soc. C. E., Chief Engineer New York, West Shore and Buffalo Railway, the members of the Society who could make it convenient to do so were invited to go to and from the Convention in a special train over that road:

WEEHAWKEN, N. J., April 8th, 1884.

TO THE MEMBERS OF THE AMERICAN SOCIETY OF CIVIL ENGINEERS :

Gentlemen,—Recollecting with much pleasure the excursion which I had in charge in 1877, at the time you visited the South Pass Jetties, at the mouth of the Mississippi River, it now gives me great pleasure to invite you, in behalf of the officers of the New York, West Shore and Buffalo Railway Company, and the New York, Ontario and Western Railway Company, to take part in an excursion over these railways to and from the Annual Convention to be held at Buffalo in June next.

There will be several works of great interest to be seen, and many pleasant views, and there also will be opportunities for inspecting the West Shore Road. Your convenience and comfort, as well as that of your families (who are most cordially invited to accompany you), will be anticipated.

Hoping to see a large number on this excursion, I remain,

Very truly yours,

E. L. CORTHELL,

Chief Engineer, N. Y., W. S. & B. Ry. Co.

This train left New York on the morning of Monday, June 9th, the day previous to the Convention, and arrived in Buffalo early in the evening of the same day. It was a special excursion train, and, under the management of Mr. Corthell and the other officers of the road, every arrangement was made for the comfort of the party, and for an inspection of the many works of engineering interest upon the line of the road. Maps and explanatory drawings were provided of specially interesting features.

The excursion train returned on Saturday, June 14th, the day after the adjournment of the Convention. A very large number of members of the Society, many accompanied by ladies, were upon the westward and eastward trips of this excursion. The following action was taken on this occasion :

TO THE PRESIDENT AND DIRECTORS, NEW YORK, WEST SHORE AND BUFFALO RAILWAY, NEW YORK, ONTARIO AND WESTERN RAILWAY, AND NORTH RIVER CONSTRUCTION COMPANY :

The members of the American Society of Civil Engineers desire to express their thanks to the management of the New York, West Shore and Buffalo Railway, and the New York, Ontario and Western Railway, and particularly to Mr. E. L. Corthell, member of the Society and Chief Engineer, and the officers who were in direct charge on the several trips to and from Buffalo, and to express their gratification at finding a road so recently constructed, which has lately passed through its first winter's disturbing influences, in such admirable condition.

As engineers, they notice that the location, grades and curvature are judiciously adapted to the needs of a great trunk line, instead of being made subservient to local demands.

As passengers, they are particularly struck with the perfection of the road-bed, and luxury and comfort of the rolling stock.

For the members present:

WM. J. McALPINE,
J. W. ADAMS,
THOS. D. LOVETT.

D. McN. STAUFFER,
Sec'y.

— MEETINGS OF THE SOCIETY.

JUNE 4TH, 1884.—The Society met at 8 P. M., Vice-President WILLIAM H. PAINE in the Chair; JOHN BOGART, Secretary. Ballots were canvassed, and the following declared elected :

As Members—James Pierson Allen (elected Junior March 5th, 1879), Charleston, S. C.; Henry Purdon Bell, Winnipeg, Manitoba ;

William Foster Biddle, Philadelphia, Pa.; Wendell Rhodes Curtis (elected Junior March 3d, 1875), Savannah, Ga.; Chauncey Ives, Chambersburg, Pa.; Mace Moulton, Wilmington, Del.; Samuel Rea, Philadelphia, Pa.; Percival Roberts, Jr. (elected Associate May 7th, 1879), Philadelphia, Pa.; Levi Lockwood Wheeler, St. Louis, Mo.

As Associates—Alan Hyde Gardner Hardwicke, Buffalo, N. Y.; William Roberts, Waltham, Mass.

As Juniors—William Henry Breithaupt, St. Louis, Mo.; Allan Darst Conover, Madison, Wis.; Martin Gay, West New Brighton, N. Y.; Silas Bent Russell, St. Louis, Mo.; Chandler Dannat Starr, New York City.

A paper by A. M. Wellington, M. Am. Soc. C. E., on "Experiments with New Apparatus in Journal Friction at Low Velocities," was read by the author, and discussed.

BUSINESS MEETING DURING THE CONVENTION.

JUNE 10TH, 1884.—Business meeting at the Annual Convention. The meeting was called to order, Vice-President JOSEPH P. DAVIS in the Chair; JOHN BOGART, Secretary.

The following members of the Society were appointed the Nominating Committee, in accordance with Section XXIV. of the By-Laws :

Albert Fink, of New York; George E. Gray, of San Francisco; George S. Field, of Buffalo; Thomas C. Keefer, of Ottawa; Henry Flad, of St. Louis.

The Committee on a Uniform System for Tests of Cement, referring to the report presented at the Annual Meeting, and since printed in the Transactions of the Society, reported progress. On motion, the report was accepted and the Committee continued.

The Report of the Committee on Uniform Standard Time was presented and read by SANDFORD FLEMING, M. Am. Soc. C. E., Chairman of the Committee, as follows :

REPORT OF THE SPECIAL COMMITTEE ON UNIFORM STANDARD TIME.

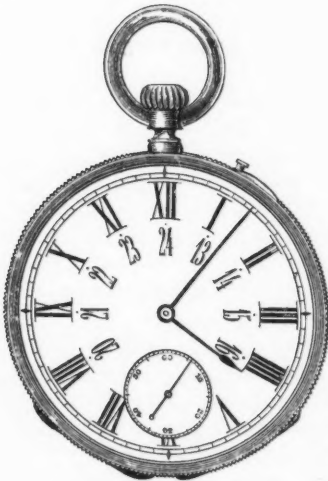
The Committee beg leave to refer to the report submitted at the Annual Meeting of the Society, held at New York, on the 16th January last, in which they set forth the various steps taken by the Society in promoting the proper regulation of Time, and the adoption of Time Standards.

The Committee referred with much satisfaction to the fact that the railway authorities generally had determined to adopt one of the reforms advocated by the Society, and that on the 18th November last, trains commenced to run throughout the United States and Canada by Hour Standards, and that the public, with singular unanimity, accepted the change, which they now universally recognize as a great public boon.

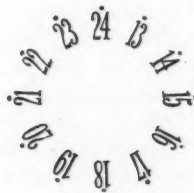
In the documents widely circulated two years ago by the Committee, under the authority of the Society, a series of questions bearing on the whole subject were submitted to men in prominent positions in the railway world, including engineers, traffic managers and known scientists in every State in the Union, and in every Province in Canada. To these questions the Committee invited replies, and among the large number of replies received, the Committee had an emphatic expression of opinion from many persons with respect to the division of the day into hours. Ninety-two (92) per cent. of those heard from gave their unqualified support to the proposal to abandon the old traditional division of the day into halves of twelve (12) hours each, and to adopt a single series of hours from midnight to midnight, numbered from one to twenty-four (1 to 24).

A list of gentlemen who have carefully examined this branch of the subject and who, in their replies referred to, have given opinions decidedly in favor of the proposed change, is appended to this report.

It is proposed to adapt clocks and watches now in use to the change, by having inscribed on the existing dials the new numbers of the afternoon hours,—thirteen to twenty-four (13 to 24) inclusive, as in the Plate No. 1.



No. 1.



No. 2.

The only practical difficulty to be overcome is met by the simple expedient of placing on the face of the watch or clock a supplementary dial showing the new afternoon hours in Arabic numerals within the present Roman figures.

Plate No. 2 shows the supplementary dial; it must be of thin material,

and it has been found that made simply of paper and secured to its position by any gum which will adhere to an enameled surface, the object is attained without any further alteration of the watch or clock.

The Committee is aware that these seem trifling matters to bring under the notice of the Convention, but questions of great moment not seldom hinge on small details. It is evident from what has been set forth, that every person in the community may, at the cost of a few cents in each case, adapt his watch to the 24 o'clock system.

The Committee accordingly repeat their conviction that with the disappearance of the only practical difficulty at an insignificant cost, there is nothing to prevent the railway authorities and the community at large adopting the change as soon as they become alive to its advantages.

The Committee do not, on this occasion, consider it necessary again to refer to the public benefits to be derived from the new notation of the day. The advantages have been fully established and have been frequently discussed at various meetings of this Society.

That the American Society of Civil Engineers, as a body, fully appreciate the importance of the change is evident from the fact that since the last Annual Meeting the Society has practically adopted the 24 o'clock system in all arrangements of meetings, and in all matters in which the hour of the day is referred to.

The Committee cannot doubt that the influence of the Society in this reform will ultimately lead to equally satisfactory results as have been obtained by their efforts in the establishment of the standard hour system throughout the Continent.

The Committee deem it proper to recall the action taken at the Washington Convention in May, 1882. On that occasion the Society resolved to petition Congress to take steps to establish a Prime Meridian as a zero for reckoning time, and for the computation of longitudes. Subsequently Congress passed a joint resolution authorizing the President to call an International Conference to fix on and recommend for universal adoption such a zero, and in conformity with the Act of Congress the President has called an International Conference, to be held at Washington, on the 1st October next.

The Act of Congress has authorized the appointment of three delegates for the United States to the conference, and it appears to the Committee appropriate that the railway and the other interests of the country, of which to a certain extent the American Society of Civil Engineers is the exponent, should be there represented.

Your Committee accordingly recommend that the President of the United States be respectfully memorialized by the Society to appoint one delegate to represent these important interests at the Washington Conference.

For the Special Committee on Standard Time,

SANDFORD FLEMING, *Chairman*.

BUFFALO, 10th June, 1884.

APPENDIX TO REPORT.

THE 24 O'CLOCK SYSTEM.

List of Engineers, Railway Presidents, Traffic Managers, Scientists and other prominent persons, who, in their replies to questions issued in 1882 by the Standard Time Committee, gave their unqualified preference to a division of the day into a single series of hours numbered from one to twenty-four (1 to 24).

In addition to this list, a number of gentlemen expressed themselves in favor of the 24 o'clock system for Railway Time Tables, but were in doubt as to the possibility of bringing it into common use for all purposes.

Only eight (8) per cent. of all heard from expressed themselves as unfavorable to the 24 o'clock system.

The names with an asterisk (*) are members of the American Society of Civil Engineers :

| NAME. | OFFICIAL TITLE. | ADDRESS. |
|----------------------------|---|-------------------|
| W. J. McAlpine, M.I.C.E.* | Past Prest. Am. Soc. Civil Engineers | Bay Ridge, N. Y. |
| M. J. Becker* | Chief Eng'r P. C. & St. L. R. W. Co. | Pittsburgh, Pa. |
| Martin W. Harrington... | Director Astron. Observatory..... | Ann Arbor, Mich. |
| H. T. Eddy, Ph. D..... | Prof. of Mathematics, Astron. and Civil Eng., Univer. of Cincinnati. | Cincinnati, Ohio. |
| Robert Fletcher, Ph. D.* | Prof. of Civil Engineering..... | Hanover, N.H. |
| P. H. Philbrick*..... | Prof. C. E., State Univ. of Iowa.... | Iowa City, Iowa. |
| E. A. Doane*..... | Chief Eng., Rome, W. and Og'gh R. | Oswego, N. Y. |
| Henry B. Richardson*... | Chief State Engineer..... | New Orleans, La. |
| H. Stanley Goodwin*.... | Asst. Gen. Super. Lehigh Valley R. R. Co..... | Bethlehem, Pa. |
| Robert Briggs*..... | ..... | Philadelphia, Pa. |
| S. Spencer..... | 3d V. P., B. & O. R. R..... | Baltimore, Md. |
| C. B. Comstock*..... | Lieut.-Colonel of Engineers..... | Detroit, Mich. |
| W. A. Doane*..... | Principal Asst. Eng. R. W. & O. R. R. | Oswego, N. Y. |
| Francis J. Lynch, M.I.C.E. | In charge Canad'n Pacific R'y Office | Ottawa, Canada. |
| James H. Rowan, C. E.... | Ex-District Eng., C. P. Railway... | Winnipeg, Man. |
| B. M. Harrod, C. E.*.... | Member Miss. River Commission... | New Orleans. |
| C. S. Masten*..... | Engineer in charge Western Division W., St. L. & P. Railway... | St. Louis, Mo. |
| James Hall, D. P. S. | Ex-Sheriff and Ex-M.P..... | Peterboro', Ont. |
| W. A. Sweet*..... | Prest. Sanderson St. Co..... | Syracuse, N. Y. |
| Wm. T. Jennings..... | Rest. Engr., C. P. R..... | Keewatin, Man. |
| M. G. Howe*..... | Eng. and Sup., H. & T. C. R. R.... | Houston, Texas. |
| Robert H. Sayre..... | Sup. and Eng. Lehigh Valley R. R. | Bethlehem, Pa. |
| Robert Moore, C. E.*.... | ..... | St. Louis, Mo. |
| J. Foster Crowell*..... | Assistant Engineer P. R. R..... | Pittsburgh, Pa. |
| T. J. Potter..... | 3d Vice-Pres., etc., C. B. & O. R. R. | Chicago, Ill. |
| W. B. Smellie..... | Cons. Eng. Canadian Pacific R'y... | Montreal, Ca. |
| Julius W. Adams*..... | Past Pres. Am. Soc'y Civil Eng.... | Brooklyn, N. Y. |

| NAME. | OFFICIAL TITLE. | ADDRESS. |
|--------------------------|---|--------------------|
| F. N. Gisborne..... | Super. Tel. Sig. Serv., Dom. Canada | Ottawa. |
| James H. Harlow*..... | Eng. Monongahela Navigation Co.. | Pittsburg, Pa. |
| Edward S. Philbrick*.... | | Boston, Mass. |
| Kivas Tully..... | Vice-Pres. Canadian Institute..... | Toronto. |
| T. H. Perry..... | Chief Eng. L. E. & W. Rd..... | Lafayette, Ind. |
| J. W. Putnam*..... | N. O. & M. R. R..... | New Orleans. |
| Charles H. Swan*..... | Mem. Am. M. Soc..... | Highlands, Boston. |
| Sir Charles Tupper..... | Minister of Railways and Canals... | Ottawa, Ca. |
| Jos. P. Davis*..... | Vice-Pres. Am. Tel. Co..... | N. Y. City. |
| P. S. Archibald..... | Chief Eng. Intercolonial Railway.. | Monckton, N. B. |
| H. E. Stevens*..... | U. S. Asst. Engineer..... | St. Paul, Minn. |
| B. S. Henning..... | Pres. Ohio Lo. R. W. Co..... | 115 Broadway, N.Y. |
| J. Milton Titlow*..... | Principal Asst. Eng., City Hall... | Philadelphia, Pa. |
| C. A. Young..... | Prof. Astron. Col. of New Jersey... | Princeton, N. J. |
| Robert A. Shailer*..... | Asst. Supt. Edgemoor Iron Works. | Wilmington, Del. |
| L. B. Archibald..... | Supt. Prince Edward Island R'y... | Charlottetown. |
| F. P. Stearns*..... | Asst. Eng. Boston Imp. Sewerage. | Atlantic, Mass. |
| C. S. Davidson..... | Supt. Hud. Div. N.Y., N. H. & H.R.R. | Hartford, Conn. |
| Edward Maguire..... | Captain of Engineers, U. S. A..... | ..... |
| E. G. Ferris..... | Engineer D. & N. R. R..... | S. Norwalk, Conn. |
| Collingwood Schreiber.. | Chief Eng. and Gen. Man. Canadian Government Railways..... | Ottawa, Ca. |
| Henry Gannett..... | Geographer of Census and of U. S. Geological Survey..... | Washington, D. C. |
| James P. Howley..... | Asst. Provincial Geologist..... | St. Johns, Nfld. |
| W. H. Wood..... | U. S. Asst. Engineer..... | St. Paul, Minn. |
| F. M. Towar..... | U. S. Asst. Engineer..... | St. Paul, Minn. |
| Julius J. Duraye..... | U. S. Asst. Engineer..... | St. Paul, Minn. |
| Thomas S. Sedgwick*.... | Land Agt. Atlantic & Pac. R'd Co.. | Albuquerque, N. M. |
| Geo. M. Dawson..... | Asst. Director Geological Survey.. | Ottawa, Ca. |
| T. C. Mendenhall..... | Prof. Physics Ohio State Univer... | Columbus, Ohio. |
| L. J. LeConte*..... | Res. Eng., Oakland Harbor..... | Oakland, Cal. |
| Edward C. Pickering.... | Director Harvard Col. Observatory | Cambridge, Mass. |
| H. F. Royce..... | Division Superintendent..... | Des Moines, Iowa. |
| J. S. Sewall*..... | ..... | St. Paul, Minn. |
| Wm. B. Hazen..... | Brig. and Brevet Maj.-Gen., Chief Signal Officer U. S. A..... | Washington. |
| G. Kennedy, M.A., LL.D.. | Law Clerk, Crown Land Depart... | Toronto. |
| E. D. Ashe..... | Directory Quebec Observatory.... | Quebec. |
| Wilson Crosby*..... | C. E..... | Bangor, Me. |
| W. H. Pratt..... | Cor. Sec. and Curator Acad. Nat. Science..... | Davenport, Iowa. |
| George S. Gatchell*..... | Gen. Supt. B., N. Y. & P. R. R.... | Buffalo, N. Y. |
| H. S. Pritchett..... | Prof. Astron'y and Director Obser- vatory Washington University... | St. Louis, Mo. |
| C. J. Ives..... | Gen. Supt. B., C. R. & W. R'y.... | Cedar Rapids, Ia. |
| Asa Horr, M.D..... | Pres. Iowa Inst. Science and Art... | Dubuque, Iowa. |
| J. L. Gillespie*..... | U. S. Asst. Engineer..... | St. Paul, Minn. |
| William P. Anderson.... | Eng. to Marine Dept., in charge construction Can. Light Houses.. | Ottawa, Canada. |
| Rufus Ingalls..... | Quarter-Master General and Brevet Major-General U. S. A..... | Washington. |
| W. E. Jacobs..... | ..... | Salt Lake City. |
| Winslow Upton..... | Army Signal Office..... | Washington. |
| H. A. Howe..... | Prof. of Math. and Astron'y Univ. of Denver..... | Colorado. |

| NAME. | OFFICIAL TITLE. | ADDRESS. |
|-------------------------------------|---|---------------------|
| D. R. Taylor..... | District Supt. N. P. R. R..... | Mandan, D. T. |
| J. R. Eastman..... | Prof. Math., U. S. N. Observ'y..... | Washington. |
| James R. Barber..... | Railway Superintendent | Cobourg, Ont. |
| DeVolson Wood*..... | Prof. Math. and Mechan., Stevens Institute, Tech..... | Hoboken, N. J. |
| Wm. F. Ellice..... | Chief Eng. Connotton Val. R'y Co.. | Canton, O. |
| Alex. Murray, C.M.G., F.G.S..... | Director Geolog. Survey, Newfd.. | St. Johns, Newfd. |
| Edwin A. Hill..... | Attorney, etc., Boston & New York Air Line R'y..... | New Haven, Conn. |
| C. D. Ward* | 314 York Street..... | Jersey City. |
| Lewis Bass..... | Director Dudley Observatory..... | Albany, N. Y. |
| Chas. A. Schott | Asst. U. S. Coast and Geodetic Sur | Washington. |
| David H. Jerome..... | Governor of Michigan..... | Lansing, Mich. |
| W. T. Sampson..... | Commander U. S. N., Asst. to Supt. Naval Observatory..... | Washington. |
| Win. Brydone Jack..... | Pres. University New Brunswick.. | Frederickton, N. B. |
| John B. Hamilton..... | Supervising Surg.-General U. S. Marine Hospital Service..... | Washington. |
| H'y F. McLeod, M.I.C.E. | Res. Eng. Canadian Pacific Railway | Drynock, B. Col'a. |
| Jacob M. Clark*..... | C. E..... | New York. |
| H. P. Dwight | Gen. Man. Great N. West Tel. Co.. | Toronto, Can. |
| William F. Bradbury... | Hd. Master Cambridge High School | Cambridge, Mass. |
| M. Giddings ..... | ..... | Bangor, Me. |
| J. W. Mallett..... | Prof. Chemistry Univ. of Virginia.. | Albemarle Co., Va. |
| D. Hudson Shedaker... | Civil Engineer | Philadelphia. |
| John Twigg..... | Town Clerk..... | Pictou, Ont. |
| E. P. Dunnington..... | Prof. Anal. Chem. Univ. of Virginia | ..... |
| Francis H. Smith..... | Prof. Nat. Phil. Univ. of Virginia.. | ..... |
| Clarence J. Blake..... | Fellow Am. Acad. Arts and Sciences | Boston. |
| Wm. M. Thornton..... | Adj. Prof. Eng. Univ. of Virginia.. | ..... |
| Albert Chapman Savage* | Asst. Ch. Eng. G. H. & S. A. R. R. | Houston, Texas. |
| M. C. Fernald..... | Pres. State College..... | Orono, Me. |
| John H. Plake..... | ..... | Boston, Mass. |
| Ed. Fontaine..... | Professor, etc., etc..... | Jackson, Wis. |
| Fred. Brooks*..... | A. E. Ferro Carril Central Mexicano | San LuisPotosi, Mex |
| Chas. F. Dowd, A.M..... | Pres. Temple Grove Sem'y..... | Saratoga Springs. |

CHARLES LATIMER, M. Am. Soc. C. E.—I submit the following resolution: That the report of the Special Committee on Standard Time be accepted, and that steps be taken to ascertain to what extent the railway corporations of the United States and Canada would be inclined to adopt, in the operation of their lines, the twenty-four o'clock system.

I wish to say, in regard to this resolution, it has been suggested that it is possible the Committee does not wish to hold absolutely to the midnight as the official point, but that it might be taken as at noon; that that point is not the fixed hour. I move, therefore, that the report be accepted and the Committee be continued.

While this matter is being considered, I desire to say a few words. Being myself in the railroad service, and having observed the operation

of the present arrangement of time in this country, I have not found any railroad operators opposed to the division of the time into meridians of one hour each ; it seems to be a very satisfactory arrangement for the railroad fraternity. I do find, however, amongst the business community of the country, a very great difficulty ; and I was brought in contact with that last night in conversing with some gentlemen at Erie. One prominent person denounced the whole system of the manner of arranging railroad time as at present used. There happened to be several superintendents on hand at the time, and we opposed his objections. He said : " Here we have in Erie three different times : Eastern time, or that of the 75th meridian ; Central time, or that of the 90th meridian ; and then there is the local time of the city of Erie, 38 minutes ahead of the Lake Shore ; so that I am entirely confounded every time I want to go away." He said he thought the whole thing ought to be turned back again. Now, to business men, this at first seems an insuperable objection. Although he had become entirely convinced that there was only one way to do, and that was to go back to the old system, I said : " Suppose, now, I am going to Buffalo, and the Lake Shore train leaves at fourteen o'clock and ten minutes, and that fourteen o'clock and ten minutes is the same upon every dial throughout the world, what would you say then ?" And I added that the local times should be divided for the different meridians as now arranged with the railroads, only exactly, none of them differing over thirty minutes, but that the time for all railroad travel and all steamships should be at one and the same moment of time throughout the whole world. He said : " If you can do that, it does away with the whole objection." I am satisfied that is so, but since it is impossible to do this as yet, although it may come to it, it is certain that the railroads would do well to adopt a twenty-four hour system now. It does not matter with them, and it does not matter with the public either, if they will think of the railroad time alone, whether it be done at one meridian or another, as far as the manipulation of the railroad is concerned. But it is important to the world that one particular prime meridian should be adopted, and the whole question is, where shall that prime meridian be ? There is to be the difficulty. Some claim you should take a meridian for a prime meridian which would pass entirely through a seam of the earth nearly the whole way, scarcely a single point of land to put an observatory on. Certainly, that is an absurdity. Others advocate that which is where the greatest commerce comes from. That would seem to be reasonable. There are others that are favorable to their own country's meridian. Some are in favor of Paris. The French people will dislike very much to give up Paris. They do not want Greenwich, simply because they want something else from the English people ; that is the whole point.

The proper point for the prime meridian of the world is the point where you have the greatest land surface north and south. There is only

one place on the earth for that, and that is in the longitude of the great pyramid of Egypt. There is a monument which has lasted 4 000 years, and will last 4 000 years more. There are other relations to it which will make the argument very much stronger. The Governments of the earth can agree to consent to a point which shall be decided by the scientific men of the world. If the scientific men of the world, after having examined all the available points, should decide that the arguments are overwhelmingly in favor of that; not by a cursory examination; not with prejudice in their minds beforehand, but through an earnest examination of the subject, such as they ought to give it and must give it; the result of such a selection should be the meridian. I do not say this merely as a fancy thought at all; I hope that no one here will think it is a fanciful idea to name that place. I believe it to be the place for good reasons. I have had the report of the Society for Preserving Weights and Measures on that particular point of standard time published, and two hundred copies of that report will be here to-morrow morning to be presented to each one of the members. I have had it published for this particular occasion. The Committee of that Society on Standard Time is composed of most intelligent men, both here and elsewhere. One of them is Professor Stockwell, the astronomer; another is Sandford Fleming; another is William H. Searles, a member of this Society; another is Professor Piazzi Smyth; another is Abbe F. Moigno; another is Mr. Wood, an Episcopalian clergyman, who has given a great deal of his time to astronomy and mathematics. I am on that Committee, but I must say, I am a very small individual in comparison with many of the others. I have merely given it a thought, and indicated my conviction. I beg that before the question comes up, as the question is simply what shall the prime meridian be, that you will carefully weigh every argument *pro* and *con*, and especially ascertain the objects of the men who have agreed that Greenwich should be the prime meridian of the world.

The resolution as above printed was seconded and adopted.

WILLIAM E. WORTHEN, M. Am. Soc. C. E.—I move the adoption of the following resolution:

That a memorial be addressed to the President of the United States, setting forth the substance of the report of the Committee on Standard Time, and suggesting that the railway and the other important interests, of which this Society is in some measure the exponent, should be represented at the Washington International Conference, to fix and determine a prime meridian.

CLEMENS HERSCHEL, M. Am. Soc. C. E.—Mr. Chairman: I desire to offer an amendment to the resolution just offered. I think we ought to designate some member of this Society, and make the recommendation to the President of the United States that such member be appointed. If that is not done, the President of the United States will be at a loss

how to most agreeably comply with the request of the Society. On consultation with some of the members here, I now offer an amendment, and I hope it will be accepted: That the President of this Society, Mr. Don J. Whittemore, be respectfully recommended to the President of the United States as the member who is to be appointed.

The amendment was accepted, and as amended, the resolution was seconded.

The Secretary then read the resolution as amended:

Resolved, That a memorial be addressed to the President of the United States, setting forth the substance of the report of the Committee on Standard Time, and suggesting that the railway and other important interests, of which this Society is in some measure the exponent, should be represented at the Washington International Conference to fix and determine a prime meridian, by the appointment of the President of the American Society of Civil Engineers as a member of such conference.

After discussion the resolution was adopted.

FRED. BROOKS, M. Am. Soc. C. E.—Adopting the 24-hour numbering now recommended by the Committee differs from the recent adoption referred to in their report of standard time meridians, in that the latter has removed the confusion of some 75 different local times used on American railways, and gives us uniformity in the minutes and seconds marked by clocks and watches in the United States and other countries; whereas, the reform now contemplated, to give us the convenience of designating the hours of the day by an unbroken series of numbers from 0 to 24, promises no more *uniformity* than before; there is scarcely anything in which the practice of civilized nations is so uniform as in the unreasonable division of the day into forenoon and afternoon halves of 12 hours each.

Vice President DAVIS.—Is there any further business to be presented by any member?

No business was presented.

The Secretary presented the report of the Committee on the Preservation of Timber, which, on motion, was accepted, and the Committee continued.

The Secretary announced the receipt from the Chairman of that Committee, O. Chanute, M. Am. Soc. C. E., of a number of papers connected with that report, which were read by title, viz:

| | |
|--|------------------|
| Preservation of Forests..... | F. Collingwood |
| Kyanizing..... | James B. Francis |
| Kyanizing on Eastern Railroad..... | H. Bissell |
| Experience on Vermont Central Railroad..... | J. W. Hobart |
| Experience on Boston and Albany Railroad.... | E. S. Philbrick |
| Experience in Germany..... | Herr Funk |

| | |
|--|----------------|
| Experience on Chicago, Rock Island and Pacific Railroad..... | M. Alexander |
| Experience on Lehigh and Susquehanna Railroad, | L. L. Buck |
| Experience at Havre de Grace..... | E. Larkin |
| Description Thilmany Process..... | C. Thilmany |
| Description Wellhouse Process | Joseph P. Card |
| Description Gypsum Process..... | T. Plate |
| Creosoting on New Orleans and Mobile Railroad, | J. W. Putnam |
| Creosoting in General..... | E. R. Andrews |
| Creosoting on Houston and Texas Central Railroad, | M. G. Howe |
| Boucherie Process in Europe..... | E. Pontzen |

Vice-President DAVIS.—If any member desires to bring forward any business at this meeting, the opportunity is now offered.

No business was presented.

The business meeting then adjourned.

JUNE 13TH, 1884.—Continuation of business meeting at the Annual Convention. This meeting was held in compliance with a resolution offered by Charles Latimer, M. Am. Soc. C. E., and adopted by the Convention, to consider a motion to be presented by Mr. Latimer. Past President WILLIAM J. McALPINE in the chair; JOHN BOGART, Secretary.

CHARLES LATIMER, M. Am. Soc. C. E., offered the following:

Resolved, That, should the President of the United States select the President of this Society to be one of the representatives at the International Conference in October next, to decide upon the best prime meridian and best method of counting standard or cosmopolitan time, he is not to be considered committed by any action of the Society heretofore made, to advocating the commencing the daily account of hours from either "midnight or noon."

O. E. MICHAELIS, M. Am. Soc. C. E.—Mr. Chairman, I would like to call the attention of the meeting to one point that is involved here, which seems to be of some importance. The President of the United States cannot appoint, as such, the President of the American Society of Civil Engineers. He may appoint Mr. D. J. Whittemore, who will not then in that conference represent this Society, but will be one of the three United States delegates. Indirectly, he may choose to give such attention as he pleases to any views that this Society or any other body may express, but he is not directly committed to it. I think it would militate against the chances of his appointment if it were known there was any probability that he represented any special views. The gentlemen who are to meet there should not have a record of having any special views at all. I merely throw this out as a hint to the gentleman

offering the resolution. I fear it may be a bar to the appointment of any one representing this Society if it were known that he was directly trammelled, or that there was any chance of his being trammelled, in his views or the expressions of his opinion.

Mr. LATIMER.—I agree with the gentleman entirely—he is now trammelled. What we want to do is to untrammel him.

CLEMENS HERSCHEL, M. Am. Soc. C. E.—Mr. Chairman, how it can be assumed for an instant that Mr. Don J. Whittemore, whom we have recommended to the President of the United States for appointment on this commission, has received any instructions whatever as to how he shall act, is something of which I fail to see the slightest indication or the slightest suspicion. This report that was read here at the meeting and accepted, it is true, treats of the subject. There have been reports on the same subject made previously. There have been books written without number. But certainly these have not been given to Mr. Whittemore as a guide for his action. As to any act of the Society, or of any individual, I am in a position to state positively, from an authority than which there can be no higher, that Mr. Whittemore would not consider himself as instructed by this Society, or by any living being. He is a free man and carries his sovereignty under his own hat, and as such he will act when he goes to Washington.

The resolution was adopted.

The business meeting then adjourned.

OF THE BOARD OF DIRECTION.

JUNE 4TH, 1884.—Applications were considered. Financial business transacted.

JUNE 11TH, 1884.—Communications were considered in reference to the Society badge ordered by the Annual Meeting.

JULY 10TH, 1884.—Applications were considered. Financial business was transacted. Additional communications in reference to the Society badge were considered.

LIST OF MEMBERS.

CHANGES AND CORRECTIONS.

MEMBERS.

- BARNARD, A. P.....Sheffield, Berkshire Co., Mass.
 BLAND, JOHN C.....P. O. Box 814, Colorado Springs, Col.
 BOGUE, VIRGIL G.....Prin. Asst. Eng'r Northern Pacific Railroad, Western
 Division, Portland, Oregon.
 BOUSCAREN, G.....Consulting and Chief Engineer Cincinnati, New
 Orleans and Texas Pacific Ry., and associate roads,
 35 West Fourth st., Cincinnati, Ohio.
 BRODHEAD, CALVIN E.....Hustontown, Fulton Co., Pa.
 BROWN, CHARLES O.....171 Broadway, New York City.
 BURNS, EDWARD C.....Sault st., Marie, Mich.
 CAMPBELL, JOHN C.....146 West One Hundred and Twenty-second st., New
 York City.
 CHILDS, JAMES E.....Gen. Supt. New York, Ont. and Western Ry., 24 State
 st., New York City.
 CLARKE, THOMAS C.....Union Bridge Co., 52 Wall st., New York City.
 CORTHELL, E. L.Chief Eng. Tehuantepec Ship Ry., 446 West Fifty-
 seventh st., New York City.
 CROES, J. JAMES R.....(*Treasurer*), 13 William st., Room 6, New York City.
 CUNNINGHAM, D. W.....Grandin, Cass Co., Dakota.
 CURRIE, D. McN.....Room 428, Custom House, St. Louis, Mo.
 ENGLE, ROBERT L.....Myrtle ave., Walnut Hill, Cincinnati, Ohio.
 FELTON, SAMUEL M., JR...Asst. to President, New York, Lake Erie and West-
 ern R. R., 30 Euclid ave., Cleveland, Ohio.
 GOLAY, PHILIP.....Paducah, Ky.
 GRANT, WILLIAM H.....277 President st., Brooklyn, N. Y.
 JENNINGS, WILLIAM T....Contractor's Chief Engineer, Canadian Pacific Ry.,
 Yale, British Columbia.
 MCCOLLOM, THOMAS C....Civil Engineer, U. S. N. (care Am. Soc. C. E.), 127
 East Twenty-third st., New York City.
 NEXSEN, ELBERT.....1620 Fourth st., Minneapolis, Minn.
 NICHOLSON, GEORGE B....319 Russell st., Covington, Ky.
 OLNEY, LA FAYETTE.....Middletown, N. Y.
 OSGOOD, JOSEPH O.....Ch. Eng. Boston, Hoosac Tunnel and Western Ry.,
 Mechanicsville, N. Y.
 RICE, GEORGE S.....Georgetown, Colorado.
 SAFFORD, EDWARD S.....198 Calvert st., Baltimore, Md.
 SCHNEIDER, CHARLES C...35 Broadway, New York City.
 SEARS, CLINTON B.....Capt. Corps of Engineers, U. S. A., Memphis, Tenn.
 SMITH, JARED A.....Major Corps of Engineers, U. S. A., 1 Courtland st.,
 Baltimore, Md.

- STEVENS, FRANK S. Roadmaster and Div. Eng. Mohawk Div., New York,
West Shore and Buffalo Ry., Syracuse, N. Y.
- VANCE, HART. Room 24, Schurmann's Block, Louisville, Ky.
- WATKINS, F. W. Asst. Engr. Construction, Aqueduct Commissioners,
Tarrytown, N. Y.
- WELLMAN, D. W. 1415 Washington ave., St. Louis, Mo.
- WHINERY, SAMUEL. Somerset, Ky.
- WHITE, GEORGE H. P. O. Box 976, Worcester, Mass.
- WISNER, GEORGE Y. 311 Woodward ave., Detroit, Mich.
- WROTNOWSKI, ARTHUR F. Gen. Man. Clermont Improvement and Navigation
Co., Minneola, Florida.

ASSOCIATE.

- DU BARRY, E. L. (Care Norfolk and Western R. R.), Norfolk, Va.

JUNIORS.

- HAINES, CASPAR W. Track Supervisor Mexican National R. R., Calle de
Cadena No. 11, Mexico, Mex.
- HAVILAND, ARTHUR. 208 Smith st., Brooklyn, N. Y.
- PARSONS, W. BARCLAY. P. O. Box 13 (care N. S. Parsons, Jr.), Upper
Montclair, N. J.

FELLOW.

- GILMAN, C. C. 1 Broadway, Room 163, New York City.

DEATHS.

- SMITH, C. VANDERVOORT. (*Past Director* of the Society). Elected Member
July 5th, 1876. Died June 30th, 1884.
- YORKE, EDWARD. Elected Member November 1st, 1882. Died May
28th, 1884.

American Society of Civil Engineers.

PROCEEDINGS.

Vol. X.—July, 1884.

NOTE.—No meetings of the Society were held in July.

CONTRIBUTIONS TO THE BUILDING FUND.

By a resolution of the Board of Direction, all contributions to the Building Fund are to be acknowledged, from time to time, by printing lists of the same in the monthly Proceedings of the Society, and in addition to this the names of all those who may subscribe \$100 or more are to be regularly enrolled and published in future lists of the Society under the head of Subscribers to the Building Fund, and they will be entitled to receive one copy of the monthly publications, comprising all papers and Transactions of the Society, regularly for life, for each \$100 subscribed by them; such copies to be in addition to those which they may be already entitled to if they are Members or Fellows.

The following contribution is acknowledged in addition to those heretofore noted :

| | | | | | | |
|-----------------|---|---|---|---|---|---------|
| Thomas Lafon, - | - | - | - | - | - | \$20.00 |
|-----------------|---|---|---|---|---|---------|

LIST OF MEMBERS.

CHANGES AND CORRECTIONS.

MEMBERS.

DERBISHIRE, STEWARTThe Senate, Ottawa, Canada.

FINK, RUDOLPH.....Receiver and Gen. Man. Memphis and Little
Rock R. R., Little Rock, Ark.

- FLAGG, J. FOSTER.....Care of Fred. A. Taft, Dedham, Mass.
GODWIN, BRYANT.....126 Fulton street, New York City.
HUNT, CHARLES W.....13 William street, Room 6, New York City.
McNULTY, GEORGE W.....53 Broadway, New York City.
NOBLE, ALFRED.....Gen. Asst. Engineer, Northern Pacific R. R.,
St. Paul, Minn.
O'ROURKE, JOHN F.....Engineer-in-charge, St. Croix River Bridge,
Wisconsin Central Ry., P. O. Box 561, Still
water, Minn.
SEARLES, WILLIAM H.....Elyria, Ohio.

JUNIORS.

- HORTON, SANDFORD.....Niobrara, Knox County, Nebraska.
STARR, CHANDLER D.....Croton Aqueduct Office, Department of Public
Works, Yonkers, N. Y.

American Society of Civil Engineers.

PROCEEDINGS.

Vol. X.—August, 1884.

NOTE.—No meetings of the Society were held in August.

ADDITIONS TO LIBRARY AND MUSEUM.

- From American Institute of Mining Engineers, Dr. R. W. Raymond, Secretary, New York:
Proceedings of the Annual Meeting in Cincinnati, February, 1884.
Contributions to the Geology of Alabama. E. J. Schmitz.
A Process for Making Wrought Iron direct from the Ore. William Ward, A. M. M. E.
Further Determinations of Manganese in Spiegel. George C. Stone.
Sulphur Determination in Steel. Magnus Troilius.
Tables for Facilitating the Heat Calculations of Furnace Gases, containing CO_2 , CO , CH_4 , H_2 , and N_2 . Magnus Troilius.
Physical and Chemical Tests of Steel for Boiler and Ship-Plate for the United States Government Cruisers. Pedro G. Salono.
Notes on Iron Ore Deposits in Pitkin County, Colorado. W. B. Devereux.
Note on the Determination of Phosphorus in Iron. Frank Julian.
Note concerning a Grade of Iron made from Carbonate Ore. Edward Gridley.
Note on some highly Phosphuretted Pig Iron. Prof. N. W. Lord.
Note on the Presence of Lithia in Ohio Fire Clays. Prof. N. W. Lord.
The Quemahoning Coal Field of Somerset County, Pa. James P. Kimball.
Note concerning certain Incrustations on Pig Iron. Frank Firmstone and Kenneth Robertson.
Tamping Drill Holes with Plaster of Paris. Frank Firmstone.
The Torsion Balance. Alfred Springer, Ph.D.
The Apatelite Deposits of Canada. T. Sterry Hunt, LL.D., F.R.S.
The Pyrites Deposits of Louisa County, Va. W. H. Adams, M.E.
The Iridium Industry. Wm. L. Dudley.
Geologico-Geographical Distribution of the Iron Ores of the Eastern United States. John C. Smock.
Biographical Notice of Louis Gruner, Inspector-General of Mines of France. T. Egleston, Ph.D.
The Physical Properties of Coke as a Fuel for Blast-Furnace Use. John Fulton.
Some Canadian Iron Ores. Fred. P. Dewey.
An Account of a Chemical Laboratory erected at Wyandotte, Michigan, in the year 1863. W. F. Durfee.

- Differential Sampling of Bituminous Coal-seams. Dr. James P. Kimball.
- The Northern Serpentine Belt in Chester County, Pa. Dr. Persifor Frazer.
- Boilers and Boiler-Settings for Blast Furnaces. F. W. Gordon.
- The Bessemer Plant of the North Chicago Rolling Mill Company, at South Chicago. Robert Forsyth.
- The Peach Bottom Slates of Southeastern York and Southern Lancaster Counties. Dr. Persifor Frazer.
- A Systematic Nomenclature for Minerals. H. M. Howe.
- An Experimental Working of Silver Ores by the Leaching Process. J. H. Clemes.
- Improvements in Coal Washing, Elevating and Conveying Machinery. S. Stutz, M. E.
- Russell's Improved Process for the Lixivation of Silver Ores, with Critical Remarks on the Methods of Copper, Silver and Gold Extraction. C. A. Stetefeldt.
- Some Researches on the Amalgamation of Gold and Silver. T. Edleston, Ph.D.
- Improvements in Methods for Physical Tests. Arthur V. Abbott, C. E.
- Index, Volumes I to X, of the Transactions. Transactions. Vol. XI. May, 1882, to February, 1883.
- Certain Silver and Iron Mines in the States of Nuevo Leon and Coahuila, Mexico. Dr. Persifor Frazer.
- The Beneficial Fund of the Lehigh Coal and Navigation Company. Joseph S. Harris.
- Proceedings of the Chicago Meeting, May, 1884.
- The Segregation of Impurities in Bessemer Steel Ingots on Cooling. Prof. Byron W. Cheever.
- A Mexican Cupellation-Hearth. W. Lawrence Austin, Ph.D.
- A New Mineral. Nelson W. Perry.
- The Concentration of Iron Ores. Arthur F. Wendt.
- A Blast-Furnace with Bosh Water-Jacket and Iron Top. Arthur F. Wendt.
- Note on Patching Platinum Crucibles. H. J. Seaman.
- The Influence of Organic Matter and Iron on the Volumetric Determination of Manganese. J. B. Mackintosh.
- Roasting Iron Ores. John Birkinbine.
- The Miners' Fund of New Almaden. Prof. Samuel B. Christy.
- The Study of Iron and Steel. J. C. Bayles.
- The Estimation of Phosphorus in Iron and Steel. Byron W. Cheever.
- A complete Gas-Assaying Plant. Walter Lee Brown.
- The Distribution of Steam in Cities. Wm. P. Shinn.
- From the American Institute of Architects, George C. Mason, Jr., Secretary, Newport, R. I.:
- Proceedings of the 14th, 15th, 16th and 17th Annual Conventions of the Institute.
- List of Professional Members. April 1, 1884.
- From American Iron and Steel Association, James M. Swank, Secretary, Philadelphia:
- How Protection affects the Farmer. Hon. Thomas H. Dudley.
- A Science based on Assumptions. Hon. Wm. D. Kelley.
- Free Trade not the International Law of the Almighty. Hon. John A. Kasson.
- Cheap Transportation a Fruit of our Protective Policy. James M. Swank.
- Annual Report of the Secretary, containing Statistics of the American Iron Trade to January 1, 1884, and a Review of the present condition of the Iron Industry in Foreign Countries. James M. Swank.
- From the Association of Engineering Societies. H. G. Prout, Secretary of the Board, New York:
- July to December, 1883, and January to July, 1884.
- From Nathaniel Bacon, C. E., Newport, R. I.:
- Mechanical Tests of Building Material, made August, 1882, and November, 1883, at the Watertown Arsenal, Mass., by the U. S. Ordnance Department, at the request of the Commissioners for the Erection of the Public Buildings, Philadelphia, Pa.
- Reply of the Commissioners for the Erection of the Public Buildings to the request of Hon. Samuel G. King, Mayor of Philadelphia.
- From W. S. Barbour, City Engineer, Cambridgeport, Mass.:
- The Mayor's Address at the organization of the City Government, January 7th, 1884, and the Annual Reports made to the City Council for the year 1883.
- From Gen. S. V. Benét, Chief of Ordnance U. S. A., Washington, D. C.:
- Annual Report of the Chief of Ordnance for 1883.
- From Surgeon J. S. Billings, U. S. A., Washington D. C.:
- Index Catalogue of the Library of the Surgeon General's Office, U. S. Army. Vols. I and II.
- From H. Bissell, Salem, Mass.:
- The Bound Volumes of the London *Engineer*, viz.: Vols. VII to XVI inclusive, 1859 to 1863.
- From James P. Bogart, New Haven, Conn.:
- Third Report of the Shell Fish Commissioners, State of Connecticut, 1884.
- From William W. Bonnett, Waterbury, Conn.:
- Seventeenth Annual Report of the Board of Water Commissioners of the City of Waterbury, for the year ending December 31st, 1883.
- From Henry Bramall, Liverpool, Eng.:
- Modern Progress in Mine Engineering.
- From Fred. Brooks, Boston, Mass.:
- Report of the Committee on the Metric System of Weights and Measures, presented at the Annual Meeting of the Boston Society of Civil Engineers, March 19th, 1884.
- Mexican Notes. Fred. Brooks.
- The Metric System in a Civil Engineer's Office. Fred. Brooks.
- From Bureau of Education, Washington, D. C.:
- Preliminary Circular respecting the Exhibition of Education at the World's Industrial and Cotton Centennial Exposition.
- Report of the Director of the American School of Classical Studies, for 1882-1883.
- The Bufalini Prize.
- Education in Italy and Greece.

From A. J. Chaphe, St. Louis :
Semi-Annual Reports of the Chief Engineer and Superintendent of the St. Louis Water Works, from Nov. 1st, 1876, to May 1st, 1877.

From Chief of Engineers U. S. A., Washington, D. C. :
Report of the Chief of Engineers on the necessity of making immediate Appropriations for continuing Work on important River and Harbor Improvements.

Reports of Examination of the Lakes near the Head Waters of the Cannon River, and of the Minnesota River, in Minnesota, with a view to Increasing the Reservoir System of the Mississippi.

Report of Gen. Q. A. Gillmore, containing Plans and Estimates for the Improvement of St. John's River, Florida, &c.; with accompanying maps.

Report of Survey of the White River, Arkansas.

Report of an Examination and Survey of Pearl River, Mississippi.

Letter of Chief of Engineers, with plan and estimate for Harbor of Refuge at Ludington, Mich.

Report of S. T. Abert, United States Civil Engineer, of Results and Surveys of certain Creeks and Rivers in Virginia and North Carolina.

Report of Capt. James Mercur of the Results of Surveys of Clubfoot, Harlowe, and Newport Rivers, and Edenton Bay, North Carolina.

Report of Gen. G. Weitzel of the Results of Surveys under his direction of certain portions of the Delaware, Susquehanna, and Brandy wine Rivers.

Report of Gen. Newton, Corps of Engineers, with maps, of Results of Surveys of Miniscong Creek, Sangerties Harbor, Peckskill Harbor, New York.

Report of Majors McFarland and Barlow upon Examinations and Surveys of the Harbors of Black Rock, Stamford, Westport, Bradford, Duck Island, and Madison, Conn., and of Peconie River, and Southold Harbor, New York.

From George H. Cook, State Geologist, New Brunswick, N. J. :
Catalogue of Rutgers College, at New Brunswick, N. J., 1883-1884.

Nineteenth Annual Report of Rutgers Scientific School, New Brunswick, N. J., for the year 1883.

Annual Report of the State Geologist for the year 1883.

From Theodore Cooper, New York :
General Specifications for Iron Railroad Bridges and viaducts (Class A.) (3 copies.)
General specifications for Iron Railroad Bridges and Viaducts (Class B.) (3 copies)
General Specifications for Iron Railroad Bridges and Viaducts (Class C), (3 copies).

From Joseph P. Cotton, Newport, R. I. :
Advertisement, Specifications and Proposals for Building Cushing Cylinder Piers.

From Wm. A. Crafts, Clerk Board of Railroad Commissioners, Boston, Mass. :

Fifteenth Annual Report of the Board of Railroad Commissioners. Jan., 1884.

From J. James R. Croes, New York :
The Sewerage of Geneva, N. Y. Reports to the Board of Trustees of the Village, by the Committee of Citizens and J. J. R. Croes, C.E.

The Sewerage of South Orange, N. J. J. J. R. Croes.

From Joseph P. Davis, New York :
American Bell Telephone Co. vs. The Overland Telephone Co. of New Jersey. Brief for complainants on motion for preliminary injunction.

American Bell Telephone Co. vs. A. E. Dolbear. Pleadings, evidence and exhibits, containing drafts answer and proofs on motion for injunction.

From Carlos D. Duncan, Secretary Argentine Scientific Society, Buenos Ayres :

The Argentine Republic as a field for European Emigration. A statistical and geographical review of the country and its resources, with all its various features. By Francis Latzina, Chief of the Argentine National Statistical Bureau, Buenos Ayres, 1883.

From Messrs. Dyckerhoff and Sohne, Amoenburg, Germany :
Untersuchungen uber den Nachweis von verfälschungen in Portland Cement.

From James B. Eads, St. Louis, Mo. :
Improvement of Galveston Harbor. Argument of Mr. Eads before the Senate Committee on Commerce, May 21st and 22nd, 1884. (Copies for distribution.)

From Charles Eason, London, England :

Manual of Financial, Railway, Agricultural and other Statistics, for Politicians, Economists and Investors. Charles Eason, jr., M.A.B.L.

From Engineers' Club of Philadelphia, Howard Murphy, Secretary, Philadelphia :

Proceedings. Vol. III, No. 5, and Vol. IV, No. 1.

List of Members. October, 1883.

From M. N. Forney, Secretary Master Car Builders' Association, New York :

Proceedings of the Seventeenth Annual Convention of the Master Car Builders' Association, held in Chicago, June 12th, 13th and 14th, 1883.

From James T. Gardiner, Director New York State Survey, Albany, N. Y. :

Report of the New York State Survey for the year 1883.

Third Annual Report of the State Board of Health of New York.

Report to the State Board of Health on the Methods of Sewerage for Cities in large Villages in the State of New York. James T. Gardiner.

From Robert Gordon, Henzada, British Burmah, India :

Notes on subjects connected with works in the Irrawaddy Circle, British Burma, with records of experiments on the double float and Woltmann meter-current measurements.

From Hon. Thomas Harlan, Member Board Water Commissioners, Newark, N. J. :

Annual Report of the Newark Aqueduct Board for the year ending November 30th, 1883.

From James H. Harlow, Pittsburgh, Pa. :

Forty-fourth Annual Report of the Board of Managers of the Monongahela Navigation Co.

- From Harrison Safety Boiler Works, Germantown Junction, Philadelphia, Pa. :
Plan showing Harrison's Safety Boilers.
- From Albert B. Hill, City Engineer, New Haven :
Annual Report of the Department of the Board of Public Works, City of New Haven, Conn., for the year 1883.
- From John R. Hudson, C.E., Utah and Wyoming R. R., Ogden, Utah :
Tables for Calculating the Cubic Contents of Excavations and Embankments by an improved method of diagonals and side triangles. John R. Hudson, C. E. New York, 1884.
- From Institution of Civil Engineers, James Forrest, Secretary, London :
On the Mining and Treatment of Gold Ores in the North of Japan. Robert James Frecheville.
On the Mechanical Examination and Testing of Portland Cement. Henry Faija.
Timaru Water Supply. Arthur Dudley Dolson.
On the Practical Results obtained from various Water-raising Machines in Holland. G. Suppari.
Dredges and Dredging on the Tees. John Foulter.
On the Theory of the Dynamo-Electric Machine. Rudolph J. E. Clausius.
The Foundations of the Alexander II. Bridge. Wm. Anderson.
Notes on Cylinder Bridge Piers. John Neuman.
The new Eddystone Light-House. Wm. Douglass, with an abstract of the discussion upon the paper.
On the Generation of Steam and the Thermo-dynamic Problems involved. Wm. Anderson.
On Electrical Conductors. Wm. Henry Preece, with an abstract of the discussion upon the paper.
An Artesian Well at Bourn, Lincolnshire. James Pillrow.
Construction of the Bhim Tel Dam Kumaow, N. W. P., India. Francis Henry Ach-burst.
Address of Sir J. W. Bazalgett, C. B., President Inst. C. E.
Charter, By-Laws, Regulations and List of Members.
Minutes of Proceedings of the Institution of Civil Engineers. Vols. LXXV and LXXVI.
The Practical Applications of Electricity Sess 1882-1883.
The Adoption of Standard Forms of Test Pieces for Bars and Plates. William Hackley, B.S., with an abstract of the discussion upon the paper.
Pumping Hot Water. Henry James Coles.
Speed on Canals. Francis Roubilliac Conder, with an abstract of the discussion upon the paper.
The Ashti Tank. Charles Toler Burke, B. E.
On Gas Engines. Aime Witz, translated and abstracted by Edward Hopkins.
Strath Taieri Bridge, New Zealand. Robert Hay.
The Delta of the Nile. Notes of a Journey through the North-east Portion, in April, 1884. Wm. Anderson.
The Western Division of the Canadian Pacific Railway. By the late J. C. James and Alan Macdougall.
On Repairing the Cables of the Allegheny Suspension Bridge, at Pittsburgh, Pa. Francis Collingwood.
The Wandle Valley Main Drainage. William Sante Crimp.
From Iron and Steel Institute, J. S. Jeans, General Secretary, London :
The most recent Results obtained in the Application and Utilization of Gaseous Fuel. W. S. Sutherland.
Delta Metal. Alexander Dick.
Iron and Steel Permanent Way. Walter R. Browne, M. Inst. C. E.
A New Form of Gas Apparatus for Testing Waste Gases from Boilers and Heating Stoves. J. E. Stead.
Recent Improvements in Iron and Steel Ship-building. William John.
The Spectroscopic Examination of the Vapor involved on Heating Iron, &c., at Atmospheric Pressure. John Parry.
On the Use of Raw Coal in the Blast Furnace. I. Lowthian Bell, F.R.S.
Gas Puddling and Heating Furnaces, with Special Reference to the "Casson Bicheroux" System. R. S. C. B. Hill.
Note on Ammonia in Cleveland Blast Furnace Gas, and on a special form of Aspirator for drawing off Gas in making Ammonia Determinations. J. E. Stead.
The Behavior of Armor of different kinds under Fire. Capt. Corde Browne.
The Journal of the Iron and Steel Institute, 1883.
Catalogue of the Library of the Iron and Steel Institute, London, January 30th, 1884.
From Rev. M. T. Jefferis, West Chester, Pa. :
First Annual Report of the Midland Railroad Company of New Jersey, from May 16th, 1880, to January 1st, 1881.
Rockford, Rock Island and St. Louis Railroad Company.
The Chesapeake and Ohio Railroad, November 1st, 1872.
Twenty-first Annual Report of the West Chester and Philadelphia Railroad Company. Philadelphia, November 1st, 1870.
Report of the Lehigh Coal and Navigation Company. May 7th, 1867.
Twenty-second Annual Report of the Lehigh Valley Railroad, Philadelphia, January 16th, 1877.
Annual Report of the Tebo and Neosho Railroad Company, 1868-69.
The Union Pacific Railway, or Three Thousand Miles in a Railway Car. Philadelphia, 1867.
Third Annual Report of the Danville, Hazleton and Wilkesbarre Railroad Company. Philadelphia, January 10th, 1870.
Report of the Mine Hill and Schuylkill Haven Railroad Company. Philadelphia, January 13th, 1862.
Report of the Philadelphia and Reading Railroad Company. Philadelphia, January 8th, 1877.
Report of the Investigating Committee of the Pennsylvania Railroad Company. Philadelphia, March 10th, 1874.
The Twenty-fourth, Twenty-fifth, Thirtieth and Thirty-first Annual Reports of the Board of Directors of the Pennsylvania Railroad Company.

First and Second Annual Reports of the Burlington, Cedar Rapids and Northern Railway Company of Iowa; and Burlington, Cedar Rapids and Minnesota Railway Receiver's Report.

Second, Third and Fifth Annual Reports of the Kansas Pacific Railway Company.

Acts of Incorporation of the West Chester and Philadelphia Railroad Company, and the supplements thereto, with an appendix.

Nebraska: a Description of the South Platte Country.

Quarterly Report of the Kansas State Board of Agriculture for the quarter ending June 30th, 1879.

From H. Kato, University of Tokio, Japan:

The Calendar of the Department of Law, Science and Literature, 1882-1883.

Memoirs of the Science Department, Tokio. Daigaken, No. 9.

Earthquake Measurements. J. A. Ewing, B. Sc., F.R.S.E.

From William B. Knight, City Engineer, Kansas City, Mo.:

Annual Report of the City Engineer, Water Commissioner and Superintendent of Public Buildings, City of Kansas, Mo., for the year ending December 31st, 1883.

From John Kennedy, Montreal, Canada:

Annual Report of the Harbor Commissioners of Montreal for the year 1883.

From L. H. Knapp, Buffalo, N. Y.:

Fifteenth Annual Report of the Buffalo City Water Works.

From Olin H. Landreth, Nashville, Tenn.:

Metrical Tables for Engineers on the basis of 1 meter.

From J. Fras. Le Baron, Jacksonville, Fla.:

The Atlantic and Gulf Coast Canal and Okeechobee Land Company.

From Louis J. Le Conte, Oakland, Cal.:

Three Photographs of A. W. Von Schmidt's Improved Dredging Machine.

From Louis Lesage, Superintendent, Montreal Water Works, Montreal:

Annual Report of the Superintendent of the Montreal Water Works for the year ending 31st December, 1883.

From Prof. William Dennis Marks, University of Pennsylvania, Philadelphia:

An Inquiry touching the Law of Condensation of Steam in Single and Compounded Cylinders.

From W. McDonald, Chief of Div. U. S. Commission of Fish and Fisheries, Washington, D. C.:

Eleven Maps, as follows:

1. Falls Branch, Maryland.
2. Falls Island.
3. Plan of Fish for the Great Falls of the Potomac River, Md.
4. Wrought Iron Grating for Great Falls Fishway; and seven maps showing the six sections of the plan of the Great Falls Fishway.

From Samuel McElroy, Brooklyn, N. Y.: Papers on Hydraulic Engineering: Corrosion of Cast-Iron Pipes. Samuel McElroy, C. E.

From James MacNaughton, Albany, N. Y.:

Descriptive Catalogue of the Osgood Dredge Company.

From Mechanics' Institute, San Francisco, Cal.:

Report of the Eighteenth Industrial Exhibition of the Mechanics' Institute of the City of San Francisco.

From Midland Institute of Mining, Civil and Mechanical Engineers, Joseph Mitchell, Secretary, Barnsley, England:

Transactions. November, 1883. Vols. VIII and IX.

From Mining Institute of Scotland, James Barrowman, Secretary, Hamilton:

Transactions. Vol. V, Part 9, with Index to Vol. V and Vol. VI, Parts 1 and 2.

Transactions. Jan. 31st, 1884.

From Mississippi River Commission, Lieut. S. S. Leach, Corps of Engineers U. S. A., Secretary, St. Louis:

Eight Maps of the Missouri River.

Three Maps of the Mississippi River, as published by the Mississippi River Commission.

Table of Distances from Cairo to the Passes.

From Gilbert Murdoch, St. Johns, N. B.:

Review of the Report of Hurd Peters, Esq., C.E., City Engineer on the Water Supply of the Cities of St. John and Portland.

Report of the Commissioners of Sewerage and Water Supply for the City of St. John (east side) and town of Portland.

Annual Accounts and Statements, with Superintendent's and Auditor's Reports for the year ending December 31st, 1883.

From Prof. Simon Newcomb, U.S.N., Washington, D. C.:

The American Ephemeris and Nautical Almanac for 1885, 1886 and 1877.

Report to the Secretary of the Navy on the recent Improvements in Astronomical Instruments. Prof. Simon Newcomb, U.S.N.

Astronomical Papers prepared for the use of the American Ephemeris and Nautical Almanac. Vol. II, Parts 1 and 2. Vol. III, Part 1.

From Gen. John Newton, Chief of Engineers, U.S.A.:

Report relative to the Expenditures for Rivers and Harbors, 1879-1883.

Report on the Annual Inspection of the Improvement of the South Pass, Mississippi River, for 1883. (Copies for distribution.)

Proposals as follows:

Improving Harbor at Buffalo, N. Y.

Removal of the Wreck of the Schooner *Sunbeam*, Southeast Harbor, Gloucester, Mass.

Construction of Pier in Marcus Hook Harbor, Pa.

For the Removal of the Wrecks of Lighter *Arlington*, Brigs *New York* and *Uncle Sam*, and Steamer *Gertrude*.

Improvement of Delaware River, at Smith's Island Bar.

For the Purchase of Iron removed from the Wreck of the Steamer *Nankin*, New York Harbor.

Improvement of Oakland Harbor, Cal.

- Annual Report of the Chief of Engineers for 1883. Parts 1, 2 and 3.
- Reports concerning the Dam and Government Works in the Ohio River, near Jeffersonville, Ind.
- Report of the Chief of Engineers in reference to Changes occurring in the Harbors of Fort Smith and Pine Bluff, Ark., and threatened Cut-offs and Corrosions of their Banks.
- A Report of the Chief of Engineers in response to a Resolution of the House calling for Plans and Estimates for the Improvement of Grand River below Grand Rapids, in the State of Michigan.
- Report in regard to the proposed Improvement of the Harbor of Galveston, Texas.
- Reports respecting the Workings of the Underground Telegraphic Cables laid between the Capitol and Executive Departments.
- Method of Heating, Lighting, and Ventilating the hall of the House of Representatives.
- Letter of the Chief of Engineers, with Reports of Surveys of the Passaic River, in New Jersey.
- A Report of a Board of Engineer Officers upon the subject-matter of the Bill to authorize the Construction of Bridges across the Great Kanawha River, and to prescribe the dimensions of the same.
- Proposal for Repair of Buffalo Breakwater (opened at U. S. Engineers' office, Buffalo, N. Y., May 15th, 1884).
- Improvement of San Joaquin River, Cal.
- Repairs to Breakwater at Cleveland, Ohio.
- Improvement of the Line of Inland Navigation from New Berne to Beaufort Harbor, N. C.
- Removal of Wreck of Schooner *Cora*. Advertisement, description and specifications.
- Removal of Wreck of Canal Boat *Kate Monaghan*. Advertisement, description and specifications.
- Stone for Delaware Breakwater Harbor. Advertisement and specifications.
- Improving Harbor at Cambridge, Md. Proposals for dredging.
- Advertisement, Instructions, Specifications and Proposals for Repairs at and near lower end of the last Dike of Saint Clair Flats Canal.
- Proposals for Dredging in Lynn Harbor, Mass.
- Improving Appomattox River, Va. Proposals for furnishing lumber and piles.
- Advertisement, Specifications and Proposals for Constructing four Dump-Boats for use at the Des Moines Rapids Canal.
- Report of an Examination of the Aqueduct Bridge at Georgetown, D. C. S. T. Abert, U. S. Civil Engineer.
- From New York Meteorological Observatory, Department of Public Parks, Dr Daniel Draper, Director: Abstract of Registers from Self-recording Instruments. December, 1883, January, February, March, April and May, 1884.
- From Hon. Joseph Nimmo, Jr., Chief of Bureau of Statistics, Washington, D. C.:
- Report on the Internal Commerce of the United States for the fiscal year 1881-1882.
- Commerce between United States and Mexico.
- Reciprocity of Transportation Facilities between the United States and the Dominion of Canada, and the Canadian Pacific Railway.
- From Edward P. North, New York City:
- The Resources of New Mexico. Prepared under the auspices of the Bureau of Immigration for the Territorial Fair to be held at Albuquerque, N. M., October 3d to 8th, 1881.
- From the North of England Institute of Mining and Mechanical Engineers Theodore Wood Bunning, Secretary, Newcastle-on-Tyne:
- Transactions, Vol. XXXIII, Part 3.
- From Rensselaer Society of Engineers, Troy, N. Y.:
- Selected Papers of the Society. Vol. I, No. 1.
- From Henry B. Richardson, Chief State Engineer, New Orleans, La.:
- Report of the Board of State Engineers of the State of Louisiana to the General Assembly for the years 1882 and 1883 to April 20th, 1884.
- From A. A. Robinson, Topeka, Kansas:
- Instructions to Civil Engineers concerning Surveys and Construction. Atchison, Topeka and Santa Fe R. R. A. A. Robinson, Chief Engineer.
- From Collingwood Schreiber, Chief Engineer and General Manager, Canadian Government R'ys, Ottawa:
- Reports, Railway Statistics of Canada, and Capital, Traffic and Working Expenditure of the Railways of the Dominion, 1882-1883.
- Annual Report of the Minister of Railways and Canals for the past fiscal year, from 1st July, 1882, to 30th June, 1883, on the works under his control.
- From William H. Searles, Jersey Shore, Pa.:
- Three Photographs of Lift Bridge on B. C. C. and S. W. R. R., over West Branch Canal near Jersey Shore, Pa.
- From Maj. Alfred F. Sears, Portland, Oregon:
- Report upon a System of Sewerage for the City of Portland, Oregon. December, 1883.
- From William P. Shinn, New York City:
- National Cable Railway Company's System of Traction Railways for Cities and Towns.
- From T. Guilford Smith, Buffalo, N. Y.:
- Report of the President and Managers of the Philadelphia and Reading Railroad Co. and the Philadelphia and Reading Coal and Iron Co., for the year ending November 30th, 1883.
- From Maj. Jared A. Smith, Corps of Engineers, U. S. A., Indianapolis, Ind.:
- An Article on National Improvements. The River and Harbor Bills.
- From State Board of Health, Albany, N. Y.:
- Report on the Drainage of the Tonawanda and Oak Orchard Swamps.
- From Hon. E. Sweet, State Engineer and Surveyor, Albany, N. Y.:
- Report of the State Engineer on the Canals of New York for 1883.
- From J. Nelson Tubbs, Rochester, N. Y.:
- Seventh Annual Report of the Executive Board. Rochester, N. Y., 1883.

From Lucian A. Taylor, Water Commissioner, Worcester, Mass. :
Annual Reports of the Committee on Water, the Water Commissioners, the Water Register, and the Engineer in charge of Construction of Dams and Reservoir on Tatnuck Brook of the City of Worcester, for the year ending Nov. 30th, 1883.

From P. A. Engineer J. A. Tobin, U. S. N., U. S. S., Powhatan :
Improvements in Naval Engineering in Great Britain, 1883.

From U. S. Light House Board, Washington, D. C. :
Annual Report of the Light House Board for the fiscal year ended June 30th, 1883.

From U. S. Naval Institute, Annapolis, Md. :
Proceedings. Vol. X, Nos. 1, 2 and 3, 1884.
Appendix to Proceedings. Vol. X, No. 1, 1884.

From U. S. Ordnance Department, U. S. A., Washington, D. C. :
Ordnance Notes, as follows :
Experiments with Small Shot. Major W. McClintock, R. A.

Machine Guns. Captain Lord and Charles W. D. Boresford, R. N.

Metalurgy of Iron. Introduction and Historical Sketch. Lieut. Chase, 3d Artillery.
Railways for Military Communications in the Field. Col. J. P. Maquay, R. E.
Provisional Fortification. Capt. G. S. Clarke, R. E.

Krupp's Works. Edmund Hudson.
Geometrical Solution of the Problem of the Trajectory of a Projectile in Vacuo. Prof. A. G. Greenhill, Royal Artillery Institution, with remarks by Captain John E. Greer, Ordnance Department, who had previously solved the problem analytically.

Fabrication of Eight-inch Eureka Projectiles.
Steel for Gun Hoops. Puddled versus Cast Steel as Metal for Gun Hoops. (Translated from the *Revue d'Artillerie*, December, 1883.) By 1st Lieut. Rogers Birnie, Jr., Ordnance Department.

The 80-ton Steam Hammers of Creusot and St. Chamond.

Mars-La-Tour and Gravelotte. Lieut. John Bigelow, Jr.

Field Artillery. Considerations on which its organization may be based. Capt. D. T. A. De Sotomayor, of the Spanish Army.

Paints and Lacquers for Artillery Material.

A Visit to the Artillery Practice Ground at Jueterbork. Capt. O. E. Michaelis.

Practical Instructions in Gunnery.

Improved Capstan.

Target Practice : Information for Soldiers.

Col. Guy V. Henry.

Machines for the Physical Tests of Metals.

Lieut. W. M. Medcalf, U. S. A.

Synopsis of the Principal Points in the Theory of the Probability of Fire. E. Jouffret,

Chief d'Escadron d'Artillerie.

The Hawaiian Islands and People. Capt. C. E. Dutton.

Stencil Outfit.

Strategical Value of the Inland Canal Navigation of the United States. 1st Lieut. Tasker

H. Bliss, 1st Artillery.

Report on Transcontinental Railways, 1883.

Gen. O. M. Poe.

Military Rifles. Communicated by the Director of Artillery.

Krupp Experiments.

Rifles for Large Game. The trajectories time of flight, remaining velocities, and striking energies of bullets fired from large bore and express rifles. Maj. W. McClintock, R. A.

Comparative Table of Austrian, English, French, German, Italian and Russian Field Guns, compiled from various sources, and corrected up to January, 1883. Maj. S. C. Pratt, R. A.

From Robert Van Buren, Brooklyn, N. Y. :

Annual Report of the Department of City Works of the City of Brooklyn for the year 1883.

From L. B. Ward, Jersey City, N. J. :
Report of the Commissioners of State Water Supply of New Jersey, March, 1884.

From Col. Geo. E. Waring, Secretary of the National Board of Health, Washington, D. C. :

Annual Report of the National Board of Health for the years 1879, 1880, 1882, 1883.

From Don J. Whittemore, Milwaukee, Wis. :

A Hand Book for Engineers, Architects, Masons, Contractors, Builders and Dealers in Hydraulic Cement.

Twentieth Annual Report of the Chicago, Milwaukee and St. Paul Railway Company.

From H. G. Wright, Chief of Engineers U. S. A., Washington, D. C. :

Report of the Selfridge Board relative to the Torpedo Machinery of the *Destroyer*.

Report of the Survey of North River, in front of Jersey City and Hoboken.

Resolution in relation to the Navigation of the South Pass or other public waters in Louisiana.

Reports of Surveys of the Illinois, La Salle and San Gaveon Rivers, in Illinois.

Reports of Surveys of Channels in Boston Harbor.

Reports of Surveys of certain Rivers, Harbors and Channels in Ohio, Pennsylvania and West Virginia.

Law Surveys of Newtown Creek, New York, and certain waters in New Jersey, under direction of the Chief of Engineers.

Report on the Subject of the Improvement of the Fox and Wisconsin Rivers.

Report of the Chief of Engineers showing the Stations and Duties of Officers of the Corps of Engineers, and the number of Civilian Engineers in the employ of the Government.

Annual Report for the year 1883 upon Building Monument at Yorktown, Va.

Additional Papers relating to the matter of Awards for Damages in Improving the Fox and Wisconsin Rivers.

List of Awards under Act of March 3, 1875, to aid in the Improvement of the Fox and Wisconsin Rivers.

Report of Gun Foundry Board, 1884.

A letter from the Chief of Engineers in regard to the necessity of making special provision for the payment of expenses incident to the working of Locks and Dams in the Kentucky River.

Report of Surveys of certain Waters in Florida and Alabama, with a view of improving navigation.

Reports of Surveys to ascertain the cost of placing dams and locks on the Cumberland River.

From P. K. Yates, Canajoharie, N. Y. :
Three Photograph Views of the New Cantilever Bridge at Niagara, and one view of the Collision on the New York, West Shore and Buffalo Railway, at St. Johnsville, N. Y., October 7th, 1883.

From other sources :

Transportation Lines owned, leased and controlled by the Pennsylvania Railroad Company on the first day of January, 1884.

Annual Report to the Harbor Board to the Mayor and City Council of Baltimore, for the fiscal year ending December 31st, 1883.

Report to the New York Legislature of the Commission to select and locate lands for Public Parks in the Twenty-third and Twenty-fourth Wards of the City of New York, and in the vicinity thereof.

Popular and Legal Views of Traffic Pooling.

Traffic Unity, popularly called Railway Pools.
G. R. Blanchard.

Selkirk River Bridge. Advertisement, specifications and proposals for building abutments, wing wall, etc.

The Buffalo Trunk Sewer, 1884.

What shall be the Prime Meridian for the World? Cleveland, Ohio, June, 1884.

The Gibbon Bolters Rail Joint Company of the United States.

Engineers' Book of Tables for Railway Constructions, double track, compiled for Engineering Department of New York West Shore and Buffalo Railway, and New York, Ontario and Western Railway.

Report of the Board of Commissioners of the Eleventh Cincinnati Industrial Exposition, 1883.

A New System of Weighing Machinery.

Argument of Capt. James B. Eads before the Committee on Commerce of the Senate, and the Committee on Rivers and Harbors of the House of Representatives, May 21st and 22d, 1884, in support of Senate Bill 1,632, and a like bill in the House to provide for the improvements of the Channel between Galveston Harbor and the Gulf of Mexico,

American Society of Civil Engineers.

PROCEEDINGS.

Vol. X.—September, 1884.

MINUTES OF MEETINGS.

(Abstract of such as may be of general interest to members.)

OF THE SOCIETY.

SEPTEMBER 3D, 1884.—The Society met at 8 P. M., Vice-President Wm. H. Paine in the chair; John Bogart, Secretary. The following candidates were elected: as Members—Henry N. Babcock, New Haven, Conn.; George H. Boynton, Davenport, Iowa; George H. Browne, Pittsburgh, Pa.; Moses Burpee, Fredericton, N. B.; F. A. Camp, Minneapolis, Minn.; L. P. Evans, Pottstown, Pa.; Desmond FitzGerald, Brookline, Mass.; Carl Gayler, St. Louis, Mo.; Wm. Jackson, Boston, Mass.; Emil Kuichling, Rochester, N. Y.; O. H. Landreth, Nashville, Tenn.; George B. Mallory, New York City; George E. Mann, Buffalo, N. Y.; J. J. McVean, Ionia, Mich.; Mansfield Merriman (elected Junior May 12, 1875), Bethlehem, Pa.; E. G. Nourse, Chicago, Ill.; T. W. Orbison, Iron Mountain, Mich.; Oberlin Smith, Bridgeton, N. J.; J. F. Sorzano, New York City; E. B. Taylor, Pittsburgh, Pa.; J. Nelson Tubbs, Rochester, N. Y.; R. L. Van Sant, Memphis, Tenn.; F. Floyd Weld, Waterbury, Conn.

As Associates—E. B. Guthrie, Buffalo, N. Y.; Frank H. Howes, New York City; George W. Parsons, Harrisburg, Pa.

As Junior—George A. Just, New York City.

A resolution was adopted requesting the presiding officer to appoint a committee of five to present for discussion at the Annual Meeting, regulations regarding the reading and discussion of papers at the Annual Convention.

A paper, by Edmund B. Weston, M. Am. Soc. C. E., was read, giving the description and result of experiments on the flow of water through a $2\frac{1}{2}$ -inch hose, and through nozzles of various forms and sizes; also giving the results of experiments as to the height of jets of water.

SEPTEMBER 17TH, 1884.—The Society met at 8 P. M., Vice-President W. H. Paine in the chair; John Bogart, Secretary.

A paper, giving results of experiments with rain gauges differently located, and experiments as to the ratio of depth of snow to the depth of same when melted, by Edmund B. Weston, M. Am. Soc. C. E., was read.

OF THE BOARD OF DIRECTION.

JULY 31ST, 1884.—Applications were considered. Communications in reference to the Society Badge were considered.

SEPTEMBER 3D, 1884.—Applications were considered.

SEPTEMBER 10TH, 1884.—Applications were considered. Communications in reference to the Society Badge were considered.

SEPTEMBER 17TH.—Applications were considered.

CONTRIBUTIONS TO THE BUILDING FUND.

By a resolution of the Board of Direction, all contributions to the Building Fund are to be acknowledged, from time to time, by printing lists of the same in the monthly Proceedings of the Society, and in addition to this the names of all those who may subscribe \$100 or more are to be regularly enrolled and published in future lists of the Society under the head of Subscribers to the Building Fund, and they will be entitled to receive one copy of the monthly publications, comprising all papers and Transactions of the Society, regularly for life, for each \$100 subscribed by them; such copies to be in addition to those which they may be already entitled to if they are Members or Fellows.

The following contributions are acknowledged in addition to those heretofore noted:

| | |
|----------------------------|----------|
| Theodore Cooper..... | \$100 00 |
| Julio F. Sorzano..... | 150 00 |
| William B. Storey, Jr..... | 100 00 |

ADDITIONS TO LIBRARY AND MUSEUM.

- From S. T. Abert, U. S. Civil Engineer, Washington :
Annual Report upon the Improvement of Certain Rivers and Harbors in Maryland, Virginia, and North Carolina.
- From American Academy of Arts and Sciences, Boston :
Proceedings. New Series, Vol. XI. Whole Series, XIX. Part 1: from May, 1883, to December, 1883; also Part II: from May, 1883, to May, 1884.
- From American Institute of Mining Engineers, Dr. E. W. Raymond, Secretary, New York City :
List of Officers and Members.
Memorial of Alexander Lyman Holley, C. E.
Discussion of Mr. P. G. Saloms' paper on "Physical and Chemical Tests of Steel for Boiler and Ship-plate for the U. S. Government Cruisers."
- The Hydraulic Cement Works of the Utica Cement Company, La Salle, Ill. Henry C. Freeman.
Biographical Notice of Sir C. W. Siemens. T. Egleston, Ph. D.
The Cerro De Mercado (Iron Mountain) at Durango, Mexico. John Birkinbine.
A new Method of Shaft Sinking through Water bearing Loose Materials. James E. Mills.
Russell's Improved Process for the Lixivation of Silver Ores. C. A. Stetefeldt.
Water Tube Steam Boilers at the Lucy Furnaces, Pittsburgh, Pa. William Kent.
The Cauca Mining District, U. S. Colombia, S. A. John Hays Hammond.
Recent Improvements in Copper Smelting. Frederick H. McDowell.
The Wolf Safety-Lamp. Eugene B. Wilson.
Rolling Steel Ingots with their own Initial Heat. John Grers.
The Law of the Apex. R. W. Raymond, Ph. D.
- From Association of Engineering Societies, H. G. Prout, Secretary of Board, New York City :
Proceedings. Vol. 3, No. 10. August, 1884.
- From Prof. Arthur Beardsley, Swarthmore College, Swarthmore, Pa. :
Fifteenth Annual Catalogue of Swarthmore College. 1883-1884.
- From Boston Public Library, Boston :
Thirty-second Annual Report of the Library.
- From H. R. Bradbury, New York City :
The Val De Travers Asphalt Paving Co., Limited. List of Works. December, 1883.
Report on the Works executed by the Hon. the Commissioners of Sewers of the City of London during the years 1878 to 1883.
- From W. W. Card, Secretary Westinghouse Air-Brake Co., Pittsburgh, Pa. :
Work on the Westinghouse Air-Brake.
The Westinghouse Air-Brake Co., Pittsburgh, Pa.
From Charles Colne, Secretary Panama Canal Co., New York City :
Reports of the U. S. Officers respecting the progress of work on the Ship Canal at the Isthmus of Panama.
- From Alfred G. Compton, New York City :
On a Method of Obtaining Autographic Records of the Free Vibrations of a Tuning Fork, and on the Autographic Recording of Beats. Prof. A. G. Compton.
- From Allan D. Conover, Madison, Wis. :
Report on the Sewerage of the City of Madison. A. D. Conover, C. E.
- From De Witt C. Cregier, Chicago :
A brief Memoranda of the Construction of the New Rush Street Bridge, Chicago, Ill.
- From J. J. R. Croes, New York City :
Methods of Sewage Disposal without Discharge into Streams. J. J. R. Croes, C. E.
List of Water Works. Supplement to the first issue of Statistical Tables of American Water Works. May, 1884. J. J. R. Croes, C. E.
The Sewerage of East Orange. J. J. R. Croes, C. E.
- From Charles E. Davis, Boston :
Twelfth Annual Report of the Board of Health of the City of Boston for the year 1883-1884.
- From J. H. Decker, Secretary American Water Works Association, Hannibal, Mo. :
Report of Proceedings of the Fourth Annual Meeting of the American Water Works Association, held at Cincinnati, Ohio, April 15th-17th, 1884.
- From E. B. Dorsey, New York City :
Railway Guide showing the Distance, Fares, and Running Time on Railways between London and all the Towns of Great Britain.
- From Patrick Doyle, C. E., Black Town, Madras, India :
Prospect of Artesian Borings in the Bellary District. Pat. Doyle, C. E.
Concrete Culverts. Pat. Doyle, C. E.
- From Dyckerhoff and Sohne, Amoenburg, Germany :
Mittheilungen des Vereins Deutsches Cement Fabrikanten.
- From Engineers' Club of Philadelphia, Howard Murphy, Secretary, Philadelphia :
Proceedings. Vol. IV, No. 2.
- From the Engineers' Society of Western Pennsylvania, Pittsburgh :
A Note on Allegheny River Water. Prof. Francis C. Phillips.
Experiments on Steel and Iron Riveted Girders, and Remarks on the Tests made by the Dutch Government. C. L. Strobel, C. E.
Annual Reports of Officers. Address of the President.
Is the Destruction of Forests a Cause for

the Increase in the Frequency and Height of Floods? Thomas P. Roberts, C. E.
Report of the Committee on Natural Gas.
Steam Boilers: their Construction, Setting and Management. L. C. Burnell.

From W. W. Evans, New Rochelle, N. Y.:
A Letter on Crank-Axles in Locomotives and their Demerits.

From John C. Goodridge, Jr., New York City:
Process of and Device for the Construction and Repair of Tunnels and Shafts.

From J. B. Henderson, Brisbane, Queensland, Australia:
Report on Brisbane Water Supply for 1880.

From Gen. W. B. Hazen, Chief Signal Officer, U. S. A., Washington:
Temperature of the Atmosphere and Earth's Surface.

From William A. Ingham, Secretary Board of Commissioners Second Geological Survey of Pennsylvania:
The Geology of Centre County. E. V. d'In-
villiers.

From Institution of Civil Engineers, James Forrest, Secretary, London:
Minutes of Proceedings, Vol. LXXVII, 1883-84, Part III.

Abstracts of Papers in Foreign Transactions and Periodicals.

On Galvanic Action between Wrought Iron, Cast Metals, and various Steels during Long Exposure in Sea Water. Thomas Andrews.

Distilling Apparatus Iquique. Charles M. Johnson.

Hydraulic Propulsion. Sydney W. Barnaby.
Wire-Gun Construction. James Atkinson Longridge.

Experiments on the Composition of Coal-William Foster.

Emery Wheels and Emery Wheel Machinery. Walter O. Rooper.

The Comparative Value of Labor in Different Countries. Charles O. Burge.

The New York, West Shore and Buffalo Railway, and the Methods used in its Construction. Peter C. Cowan.

The Basic Open-Hearth Steel Process. Thomas Gillott.

Experiments on the Transmission of Heat. Gustav A. Hagemann.

On the Elevation, Storage and Shipment of Grain. Woodford Pilkington.

From Institution of Mechanical Engineers, London:

Proceedings, January, 1884, No. 1.

From Stevens' Institute of Technology, Hoboken, N. J.:

Annual Catalogue of the Stevens Institute of Technology, 1884-1885.

From Lieut. S. S. Leach, Secretary Mississippi River Commission, St. Louis:

Annual Report Mississippi River Commission for 1883.*

* We have for distribution a small number of copies of the Report of the Mississippi River Commission for 1883. A copy will be forwarded to members on receipt of a request to that effect, and a remittance of forty-one cents, the cost of the expressage already paid, and the postage for forwarding. The books will be forwarded in the order of the receipt of requests.

From Hon. Wm. J. McAlpine, Bay Ridge, N. Y.:
The New York Arcade Railway as Projected, compared with the Underground Railways of London.

From New York Meteorological Observatory, Dr. Daniel Draper, Director, Central Park, New York City.
Abstract of Registers from Self-Recording Instruments, June, July, August, 1884.

From Midland Institute of Mining, Civil and Mechanical Engineers, Joseph Mitchell, Secretary, London:
Transactions, Vol. IX, Parts LXX, LXXI, and LXXII.

From John Milne, Foreign Secretary Seismological Society of Japan, Tokio:
Transactions of the Seismological Society of Japan. Vol. VII, Part I, 1883-1884.

From Mining Institute of Scotland, James Barrowman, Secretary, Hamilton:
Transactions. General Meeting, July, 1884. Vol. VI, Part III.

From Gen. John Newton, Chief of Engineers U. S. A., Washington:
Annual Report of the Mississippi River Commission for 1883.

Advertisement, Specifications, and Proposals for Ice Harbor Construction at Dubuque, Iowa.

Furnishing Rip-Rap on Board Government Barges in the Mississippi River, between Reed's Landing and Winona, Minn.
Constructing a Dam and Shore Protection of Brush and Rock at Andalusia, Illinois.
Constructing Dam and Shore Protection of Brush and Rock in vicinity of Louisiana, Missouri.

Furnishing Stone for use at the Des Moines Rapids Canal.

Furnishing Stone for Construction of Dry Dock at the Des Moines Rapids Canal.

Dredging in Quincy Bay, Illinois.

Furnishing Rip-Rap on Board Government Barges in the Mississippi River, between St. Paul and Hastings, Minn.

For River and Harbor Improvement in Maine and New Hampshire.

Ice Harbor at Mouth of Muskingum River, Ohio.

Proposals for Cement on Lock No. 8, Monongahela River.

For Dredging and Rock and Ledge Excavation in Cochecho River, New Hampshire.

For Dredging Lubec Channel, Maine.

For the Removal of Sunken Ledge in Eastport Harbor, Maine.

Repairs to Piers at Black River Harbor, Ohio.

Improvement of Mobile Harbor, Alabama.

Improvement of Pensacola Harbor, Florida.

For Dredging Moose-a-bee Bar, Maine.

Dredging at Sheephead Bay, New York.

Improvement of Potomac River, near Washington.

For River and Harbor Improvements in Maine and New Hampshire.

Improving Passaic River, New Jersey.

For Dredging Passaic River, New Jersey.

Huron Harbor, Ohio.

For Dredging Portland Harbor, Maine.

Improvement of Canarsie Bay, New York.

Improving Harbor at Buffalo, New York.

Improving Detroit River, Michigan.

Improving Channel between Staten Island and New Jersey.

Dredging in Raritan Bay, New Jersey.
 Dredging Saginaw River, Michigan.
 Improving Chicago Harbor, Illinois.
 Improving Harbor at Kenosha, Wisconsin.
 Furnishing Iron Bolts, Plates and Spikes for Crib Work at the Harbor of Refuge at Sand Beach, Michigan.
 For Harbor of Refuge, Milwaukee Bay, Wisconsin.
 Furnishing one Dredge, one Tug and two Dump Scows for removing Shoals in and around the Harbor of Refuge, at Sand Beach, Michigan.
 Furnishing a Tug for use at the Harbor of Refuge, at Sand Beach, Michigan.
 Furnishing Timber and Plank for Crib Work, at the Harbor of Refuge, at Sand Beach, Michigan.
 Improving Harbor at Menomonee (Michigan and Wisconsin).
 Improving Harbor at Grand Marais, Michigan.
 Improving Harbor at Kewannee, Wisconsin.
 Improving Harbor at Port Washington, Wisconsin.
 Improving Harbor at Two Rivers, Wisconsin.
 Improving Buffalo Bayou, Texas.
 Improving Hay Lake Channel, Saint Mary's River, Michigan; Dredging at Middle Neelish.
 Improving Harbor at Racine, Wisconsin.
 Improving Harbor at Manitowoc, Wisconsin.
 Improving Harbor at Cedar River, Michigan.
 Improving Harbor at Pensaukee, Wisconsin.
 Improving Harbor at Brazos, Santiago, Texas.
 Improving Calumet Harbor, Illinois.
 Improving Port Chester Harbor, New York.
 Improving Harbor at Cedar River, Michigan.
 Improvement of Harbor at Savannah, Georgia.
 Improving Harbor at Sheboygan, Michigan.
 Improving Harbor at Ontonagon, Michigan.
 Improving Harbor at Oconto, Wisconsin.
 Improving the Mouth of Brazos River, Texas.
 For Dredging to be done for the Improvement of Cape Fear River, below Wilmington, N. C.
 For Dredging to be done for the Improvement of Potomac River, near Washington, D. C.
 Improvement of Harbor at Charleston, S. C.
 Dredging in the Harbor of Rock Island, Illinois.
 Improving Aransas Pass and Bay, Texas.
 For furnishing one Dredge, one Tug and two Dump Scows for Dredging in Hay Lake Channel and its dependencies, Michigan.
 For the Foundations of a Movable Dam at Lock No. 6 of the Great Kanawha Improvement, located four and one-half miles below Charleston, W. Va.
 Improvement of Channel over the Bar at the Mouth of the St John's River, Florida.
 Removal of Wrecks in Harbor at New Orleans, La.
 Improving Channel leading to Harbor at Baltimore.
 Improvement of Potomac River, Washington Channel, at Washington, D. C.
 Removal of Wreck of Schooner "John S. Detweiler."
 Improvement of Potomac River, near Washington, D. C.
 Proposals for furnishing Stone for Improving Cape Fear River, below Wilmington, N. C.
 Improving Pass Cavallo Inlet into Matagorda Bay, Texas.

Removal of Wrecks, Harbor at New Orleans, La.
 Improving Harbor at Little Sodus Bay, New York.
 Improving Harbor at Ogdensburg, New York.
 Improving the Channel at the Mouth of the Connecticut River.
 Extending the New Haven Breakwater.
 Improving Trinity River, Texas.
 Furnishing Piles at Government Works in Mississippi River between St. Louis, Mo., and Harrisonville, Ill.
 Furnishing Spikes, Iron and Nails at the United States Engineer Depot, foot of Arsenal street, in St. Louis, Mo.
 Studies on Coast Defense applied to the Gulf of Spezia. Caesar Guarasei, Colonel of Engineers.
 Professional Notes, Captain Edward Maguire.
 Report on the International Exhibition of Electricity held at Paris, August to November, 1881.
 Report of Examination of the Aqueduct Bridge at Georgetown, D. C. S. T. Abert.
 Report of the Engineers upon the Natchez River, Louisiana, with a view to its improvement.

From Edward P. North, New York City:
 Report of the Board of Experts on Street Paving to Hon. William B. Smith, Mayor of Philadelphia. July 8, 1884.

From H. V. and H. W. Poor, New York City:
 Manual of Railroads, 1884.

From Ordnance Department, Gen. S. V. Benet, Chief, Washington, D. C.:
 Electricity applied to Explosive Purposes. Prof. F. A. Abel.
 Electrical Units of Measurement. Sir Wm. Thomson.
 A Peculiar Phase of Metallic Behavior. Capt. O. E. Michaelis.
 United States Life Saving Service. Capt. D. A. Lyle.
 Field Artillery Fire.
 Wild Fowl and Punt Guns. Maj. Wm. McClintock, R. A.

From Charles C. Schneider, New York City:
 Die Neue Niagarabrücke. C. C. Schneider.

From Joseph S. Smith, Philadelphia, Pa.:
 Report of the Select Committee appointed by the House of Commons to obtain information as to Geological Surveys of Ottawa, Canada.

From Hon. E. Sweet, State Engineer and Surveyor, Albany, N. Y.:
 Annual Report of the State Engineer and Surveyor on the Canals of the State of New York for 1883.

From Société des Ingenieurs Civils, Paris:
 Discussion sur les Chemins de Fer Métropolitains. July, 1884.

From Society of Engineers, Bartholomew Reed, Secretary, London:
 Transactions of the Society, 1883.

From United States Geological Survey, Washington:
 Mineral Resources of the United States. Albert Williams, Jr.

From United States Naval Institute,
Annapolis, Md.:
Proceedings. Vol. X, No. 4.

From University of Tokio, Tokio, Japan:
Phytochomische Notizen neber Einige Japanische Pflanzen. J. F. Eikman.

From W. H. Vandersmissen, Corresponding Secretary Canadian Institute, Toronto, Canada:

Proceedings of the Institute. Vol. II, Nos. 1 and 2.

From Geo. E. Waring, Jr., Newport, R. I.:

Premier Application a Paris en 1883 a L'as-samissement suivant le systeme Waring. Ernest Pontzen, Ingenieur Civil.

From John Wiley & Sons, Publishers. New York:

The Materials of Engineering. Part III: Non-Terrous Metals and Alloys. Robert H. Thurston, M. Am. Soc. C. E. New York, 1884.
Wrought Iron and Steel in Construction. Convenient Rules, Formulæ, and Tables for the Strength of Wrought Iron Shapes used as Beams, Struts, Shafts, etc., manufactured by the Pencoyd Iron Works. New York, 1884.

From F. Cope Whitehouse, New York City:

Lake Moeris. From recent Explorations in the Moeris Basin and Wadi Fadhi. F. Cope Whitehouse.

The Science Myth of Fingal's Cave. F. Cope Whitehouse, M. A.

From C. J. H. Woodbury, Boston:
Report on Automatic Sprinklers, May 15, 1884.

From H. M. Wilson, Washington, D. C.:
Mexico from the Material Standpoint. Illustrated with Maps and Diagrams. Washington, 1884.

From other Sources:

Prospectus of the Lawson Non-Explosive Boiler Company. Thomas Kays.

Directions for the Construction and Use of the Lawson Non-Explosive Boiler.

Proceedings at the Inauguration of the Buffalo Merchants' Exchange, Jan. 1, 1884.

A Sketch of the Commerce, Industries and Resources of Buffalo. Wm. Thurstone.

Mechanics and Engineers' Pocket Book of Tables, Rules and Formulas pertaining to Mechanics, Mathematics and Physics. Chas. H. Haswell.

American Society of Civil Engineers.

PROCEEDINGS.

Vol. X.—October, 1884.

MINUTES OF MEETINGS.

(Abstract of such as may be of general interest to members.)

OF THE SOCIETY.

OCTOBER 1ST, 1884.—The Society met at 8 P. M., Vice-President Wm. H. Paine in the chair; John Bogart, Secretary. The following candidates were elected Members: Burr Kellogg Field, Philadelphia, Pa.; Charles Alfred Marshall, Johnstown, Pa.; Robert Imlay Sloan, New York, N. Y.

Mr. H. Trueman Wood, Secretary of the Society of Arts, London, England, presented a short statement in reference to the International Inventions Exhibition, which it is proposed to hold in London during 1885. He expressed the desire of the management of the Exhibition that the Engineers of America should know of this exhibition and aid in securing its success. It is one of the series of exhibitions which are in progress, that of last year being devoted to fisheries, and that of the present year to subjects connected with health and education. The Exhibition of 1885 will be devoted to apparatus, appliances, processes and products invented or brought into use since 1862. It is intended to illustrate industrial processes, and not to exhibit finished products unless required for full demonstration of a particular process. The Exhibition will be under the presidency of the Prince of Wales. The Chairman of the Executive Committee is Sir Frederick J. Bramwell, Vice-President Inst. C. E. Copies of a detailed prospectus were presented by Mr. Wood. The subject was referred to the Board of Direction for consideration.

The death on September 25th of Isaac Newton, M. Am. Soc. C. E., was announced.

Announcement was made that Messrs. L. B. Ward, E. B. Van Winkle and Amory Coffin had been appointed Censors to award the Norman Medal, and that Messrs. George S. Morison and D. Farrand Henry had been appointed on the committee to award the Rowland Prize.

A paper by F. P. Stearns, M. Am. Soc. C. E., "Experiments on the Flow of Water through a 48-inch Pipe," was read.

OF THE BOARD OF DIRECTION.

SEPTEMBER 24TH, 1884.—Applications were considered. Action was taken in reference to the communications received as to the Society Badge, and a circular letter in reply was directed to be sent. Under the rules, the Board designated Messrs. Lebbeus B. Ward, E. B. Van Winkle and Amory Coffin, Members Am. Soc. C. E., to act as a Board of Censors to award the Norman Medal. Under the rules, the Board appointed Messrs. George S. Morison and D. Farrand Henry to be, with the Secretary of the Society, the Committee to award the Rowland Prize.

OCTOBER 1ST, 1884.—Applications were considered.

LIST OF MEMBERS.

ADDITIONS.

MEMBERS.

| | Date of Election. |
|--|-------------------|
| BROWNE, GEORGE HAMILTON..Supt. and Chief Engineer Water Works, Pittsburgh, Pa..... | Sept. 3, 1884. |
| EVANS, LOUIS PREVOST.....Res. Engineer, Works of Cofrode & Saylor, Potts- town, Pa..... | " " |
| FITZ GERALD, DESMOND.....Supt. Western Division, Boston Water Works, Brook- line, Mass..... | " " |
| GAYLER CARL .....Bridge Engineer, City Hall, St. Louis, Mo..... | " " |
| JACKSON, WILLIAM.....Asst. Engineer, Improved Sewerage, Boston, Mass.... | " " |
| MALLOBY, GEORGE BENJAMIN....55 Broadway, New York City. | " " |
| MANN, GEORGE EDWARD.....302 Main st., Buffalo, N. Y.... | " " |
| MARSHALL, CHARLES ALFRED....Engineer of Tests, Cambria Iron Co. (P. O. Box 766), Johnstown, Pa..... | Oct. 1, 1884. |
| MCVEAN, JOHN JAY.....Chief Engineer, Detroit, Lan- sing and Northern R. R., Ionia, Mich..... | Sept. 3, 1884. |
| MERRIMAN, MANSFIELD.....(Elected Junior May 12, 1875.) Lehigh University, Bethle- hem, Pa..... | " " |
| NOURSE, EDWIN G.....Chief Engineer, Chicago and Evanston R. R., Ashland Block, Room 8, Chicago, Ill. | " " |

| | | |
|-------------------------------|--|----------------|
| ROBERTS, EVELYN PIEREPONTE... | Asst. Engineer, Aqueduct Commission, Tarrytown, N. Y..... | May 7, 1884. |
| SLOAN, ROBERT IMLAY..... | Chief Engineer Manhattan Elevated Ry., 71 Broadway, New York City..... | Oct. 1, 1884. |
| SORZANO, JULIO FEDERICO..... | 35 Broadway, New York City. | Sept. 3, 1884. |
| TAYLOR, EDWARD BALLINGER.... | Supt. Pittsburgh, Cincinnati and St. Louis Ry., Pittsburgh, Pa..... | " " |
| VAN SANT, ROBERT LAWRENCE... | 272 Front street, Memphis, Tenn..... | " " |
| WELD, FREDERICK FLOYD..... | City Engineer, Waterbury, Conn..... | " " |

ASSOCIATES.

| | | |
|------------------------------|--|----------------|
| GUTHRIE, EDWARD BUCKINGHAM.. | Buffalo, N. Y..... | Sept. 3, 1884. |
| HOWES, FRANK HERBERT..... | 52 Wall st., New York City... | " " |
| PARSONS, GEORGE WELLMAN.... | Pennsylvania Steel Co., Harrisburg, Pa | " " |

JUNIOR.

| | | |
|-----------------------------|--|----------------|
| JUST, GEORGE ALEXANDER..... | Engineer, New Jersey Steel and Iron Co., 17 Burling Slip, New York City..... | Sept. 3, 1884. |
|-----------------------------|--|----------------|

CHANGES AND CORRECTIONS.

MEMBERS.

| | | |
|-------------------------|--|--|
| ANDREWS, JOHN W..... | Chief Engineer, Metropolitan Construction Co. and Columbus, Ft. Wayne and Western Ry., Urbana, Ohio. | |
| BIXBY, WILLIAM H..... | Capt. Corps of Engineers, U. S. A., U. S. Engineers' Office, Wilmington, N. C. | |
| FULLER, SIDNEY T..... | 16 Chester square, Boston, Mass. | |
| GIELOW, HENRY J..... | U. S. Engineers' Office, Norfolk, Va. | |
| JUDSON, JOHN A..... | 137 West Third st., Oswego, N. Y. | |
| LE BARON, J. FRAS..... | Deputy U. S. and County Surveyor, Bostwick Block, Rooms 8 and 9, Jacksonville, Fla. | |
| PROBASCO, SAMUEL R..... | 22 Sands st., Brooklyn, N. Y. | |
| TIDD, MARSHALL M..... | 10 Tremont st., Boston, Mass. | |
| WHITCOMB, HENRY D..... | Chief Engineer, Richmond and Alleghany R. R., Richmond, Va. | |

WURTELE, ARTHUR S. C. Bridge Engineer, New York Central and Hudson River R. R., 79 Niagara st., Buffalo, N. Y.

ASSOCIATE.

ANDREWS, EDWARD R. 225 West 44th st., New York City.

JUNIORS.

FRANCIS, GEORGE B. 8 Stark st., Portland, Oregon.

HASKINS, WILLIAM J. 257 West 126th st., New York City.

LEDERLE, GEORGE A. (Care George S. Morison), 35 Wall st., New York City.

WHISTLER, THOS. D. Office Engineer of Construction, Aqueduct Commissioners, Tarrytown, N. Y.

DEATH.

NEWTON, ISAAC. Elected Member, March 3d, 1880; died Sept. 25th, 1884.

THE NORMAN MEDAL.

CODE OF RULES FOR ITS AWARD.

I.—Competition for the Norman Medal of the American Society of Civil Engineers shall be restricted to members of the Society.

II.—There shall be one gold medal, and only one, struck for each and every fiscal year of the Society, and awarded as hereinafter provided. The dies therefor shall be with the Superintendent of the United States Mint at Philadelphia, in trust exclusively for the above purpose. Such medal shall be of a cost equal to the annual interest received upon \$1 000 of the Consolidated Stock of the City of New York, Certificate No. 179, of the additional new Croton Aqueduct Stock of the City of New York, authorized by an Act of the Legislature of the State of New York, Chap. 230, passed April 15th, 1870, dated November 17th, 1873, now held in trust by the Treasurer of this Society, and so held solely for this purpose, and shall be executed upon his order.

III.—All original papers presented to the Society by members of any class, during the year for which the medal is awarded, shall be open to the award, provided that such papers shall not have been previously contributed in whole or in part to any other association, nor have appeared in print prior to their publication by the Society, nor have been presented to the Society in any previous year.

IV.—The Board of Censors to award the medal shall consist of three members of the Society, to be designated by the Board of Direction. The Secretary of the Society shall act as Secretary to the Board of Censors.

V.—The medal shall be awarded to such paper as the said Board shall judge to be worthy of special commendation for its merits as a contribution to engineering science, not merely relatively as compared with others presented during the same year, but as exhibiting the science, talent or industry displayed in the consideration of the subject treated of, and for the good which may be expected to result from the discussion and the inquiry.

VI.—In case no paper presented during the year shall be deemed of sufficient value to receive an award, the amount of the interest of the fund for that year shall be expended by the Board of Direction in the purchase of books, to be offered as a premium for the second best paper in the next year in which more than one paper of sufficient value may be presented.

VII.—The medal year shall terminate on the first day of August, and the award shall be announced at the annual meeting.

VIII.—The Treasurer of this Society shall cause the medal to be prepared and delivered to, or deposited to the order of, the successful competitor, within two months after the annual meeting at which the same shall have been awarded.

THE ROWLAND PRIZE.

CODE OF RULES FOR ITS AWARD.

Not more than one prize shall be awarded each year for papers presented during the year. The year shall terminate on the first day of August, and the award shall be announced at the annual meeting in January.

The prize shall consist of fifty dollars in cash.

The award shall be made by a committee consisting of the Secretary and two members of the Society, to be appointed by the Board of Direction.

The prize shall be awarded to such paper as the committee deem most worthy of such recognition, the preference being given to papers describing in detail accomplished works of construction, their cost and manner of execution, and the errors in design and execution.

American Society of Civil Engineers.

PROCEEDINGS.

Vol. X.—November, 1884.

MINUTES OF MEETINGS.

(Abstract of such as may be of general interest to members.)

OF THE SOCIETY.

OCTOBER 15TH, 1884.--The Society met at 8 P. M., Vice-President Joseph P. Davis in the chair ; John Bogart, Secretary.

A paper by J. Albert Monroe, M. Am. Soc. C. E., on "The Re-enforcement of a River Embankment with Condemned Canal Boats, on the line of the New York, West Shore & Buffalo Railway," was read by the Secretary and discussed by Messrs. Croes, Cooper, J. C. Campbell, Chas. Paine, G. S. Greene, Jr., Ball and R. L. Harris.

A discussion on "Methods for Increasing the Efficiency of Railways for the Transportation of Freight," by E. Yardley, M. Am. Soc. C. E., was read by the Secretary.

A discussion on "The Flow of Water in a 48-inch Pipe," by R. Her-
ing, M. Am. Soc. C. E., was read by the Secretary and discussed by
Messrs. Hutton and Davis.

A paper by Desmond FitzGerald, M. Am. Soc. C. E., on "Spongilla in Pipes," was read by the Secretary and discussed by Messrs. Croes, Dorsey, Harris and Davis.

NOVEMBER 5TH, 1884.—The Society met at 8 P. M., Vice-President William H. Paine in the chair; John Bogart, Secretary. The following candidates were elected as Members: Fred. Hixon Baldwin, Tarrytown, New York; Thomas Lafon (elected Junior, March 3d, 1875), Retalhuleu, Guatamala; Charles Armstrong Scott, Halifax, N. S.; as Junior: Julius William Schaub, Toronto, Canada.

The following proposed amendment to the Constitution was submitted in writing, signed by Messrs. William P. Shinn, Chas. E. Emery, Edward P. North, Wm. G. Hamilton and H. D. Blunden, Members of the Society:

PROPOSED AMENDMENT TO ARTICLE XXII.

Add at end of article as follows:

Any member of the Society, not in arrears for dues, may compound for future annual dues by the payment of two hundred and fifty dollars.

Provided, however, that each person duly elected a Member shall pay the entrance fee and also the annual dues for the current year of his election.

Provided, also, that any Member desiring to compound for future annual dues shall have paid the annual dues for the current year before the compounding sum may be available.

Provided, also, that in addition to the sum provided for compounding dues, there shall be paid by each compounding member, resident within fifty miles of the post-office in the City of New York, the sum of ten dollars per year for five years after compounding.

Should a resident member become non-resident at any time during the five years after compounding, he shall be relieved from the payment of such annual sum during the time of non-residence.

Should a non-resident member become resident at any time within five years after compounding, he shall be liable to the annual payment of ten dollars for each year of residence up to five years after compounding.

Members compounding shall sign an agreement that they will be governed by the Constitution and By-Laws of the Society as they are now formed or as they may be hereafter altered, amended or enlarged; and that in case of their ceasing to be members from any cause whatever, the amount theretofore paid by them for compounding, and for entrance fees and annual dues, shall be the property of the Society.

The following proposed amendment to the By-Laws was proposed in

writing by Mr. Theodore Cooper, M. Am. Soc. C. E., and seconded by Mr. J. J. R. Croes, M. Am. Soc. C. E.:

Amend Section 19 so as to read as follows :

(The Amendment is in italics.)

SECTION 19.—A nomination or proposal shall be presented at the next regular meeting of the Board of Direction following its receipt; *the Board of Direction shall thereupon send to all members of the Society a notice that such person is a candidate for election. Not less than thirty days thereafter the Board shall consider the application, and if approved* and the applicant (if for admission as Member, Associate or Junior) classed with his consent, a day shall be fixed for the ballot to be canvassed, which shall be at a regular meeting of the Society, not less than twenty-five days thereafter.

A paper by Alfred F. Sears, M. Am. Soc. C. E., on "Commercial Cities; the Law of their Birth and Growth," was, in the absence of the writer, read by the Secretary and discussed by Messrs. R. L. Harris, Bogart, Griswold, Cooper and G. S. Greene, Jr.

NOVEMBER 19TH, 1884.—The Society met at 8 P. M., Vice-President Joseph P. Davis in the chair; John Bogart, Secretary. The death, on November 10th, 1884, of Mr. G. Jordan, M. Am. Soc. C. E., elected September 18th, 1872, was announced.

The following papers were read and discussed : "Description of some Experiments made on the Providence Water Works to ascertain the Force of Water Ram in Pipes," by E. B. Weston, M. Am. Soc. C. E.

"Note on Increasing the Accuracy of a System of Magnetic Bearings of a Survey, applicable to a Closed Survey or Traverse," by O. H. Landreth, M. Am. Soc. C. E.

"Suggestions as to Flattening Ends of Railway Curves," by A. P. Man, Jr., M. Am. Soc. C. E.

OF THE BOARD OF DIRECTION.

OCTOBER 29TH, 1884.—Applications were considered; financial business transacted. A letter from Col. Julius W. Adams, Past-President Am. Soc. C. E., was received, accompanying the presentation of a number of valuable books on architecture. Suitable acknowledgment of this addition to the Library of the Society was directed, and it was also resolved that the letter should, with the permission of the writer, be published in the Proceedings. It will be found below.

NOVEMBER 12TH, 1884.—Applications were considered.

NOVEMBER 19TH, 1884.—A circular was prepared and ordered to be issued in reference to the amendment to the By-Laws proposed at a recent meeting of the Society.

Letter from Col. Julius W. Adams, Past-President Am. Soc. C. E., accompanying the presentation to the Society of a number of works on architecture. Printed at the request of the Board of Direction:

NEW YORK, October 22d, 1884.

MR. JOHN BOGART, *Secretary Am. Soc. C. E.*:

My Dear Sir,—As you may remember, our Society was originally incorporated as the American Society of Engineers and *Architects*, and that, after much opposition, I was mainly instrumental in bringing about a change of sentiment among the members, which resulted in dropping the word “architect” from the title of the Society.

This effort on my part arose from no wish to underrate the importance of, or, rather, I should say, the needed qualifications for the sister profession of architecture; but, on the contrary, it arose from the conviction, in which my studies had confirmed me, that the individual, mental organization which was essential to success in the practice of architecture, was incompatible with the severer studies which were required as the basis for the education of the Engineer, thus drawing the distinction between the mere art of building and architecture, properly so called, which is a fine art, and hence closely associated with the arts of design.

It may be said, on the other hand, that Michael Angelo, DeVinci and others acquired world-wide fame, both as architects and engineers.

The exceptions to be made in their favor but prove the rule.

Michael Angelo, as also DeVinci to a less degree, and Raphael, were exceptional men in every sense.

The first was painter, poet, sculptor, architect and engineer, and great in each. Many of the celebrated painters of those days were architects *because they were painters*, showing the intimate relationship considered as existing between the two arts.

If some of them exhibited skill as engineers, it grew out of the needs of the times, coupled with the all but universal genius of the individuals; and it is this latter consideration which would seem to leave small hopes for most of us in the endeavor to rival the success of the old masters in art.

While I had these views of the high mission of the architect, I must admit, of course, that there are points of agreement between the two professions, so far as the principles underlying the art of building merely (which alone is not architecture), is a common factor in the *practice* of both professions; and, while an architect must be something of an engineer, the functions of an engineer call for no acquaintance with any branch of the Fine Arts, further than as an *accomplishment*, which, if his individual tastes lead him in that direction, his lighter moments may well be passed in gathering some of the principles of the arts of design, but entirely subordinate to the severer studies of his own profession.

I propose, by this small contribution of architectural works, to fill a shelf of your Library, as the nucleus for further extension in this direction, as the taste of members may indicate as desirable. At a future day I may hope to add something to it, but for the present content myself with filling the spare room in the boxes which I send, by enclosing some engineering works of no special value now, beyond the interest which attaches to records of the early practice of the profession, and so, by comparison, exhibiting the immense strides in the practice of the modern engineer.

Very truly yours,
JULIUS W. ADAMS.

MEMOIRS OF DECEASED MEMBERS.

ARTHUR SPIELMANN, M. Am. Soc. C. E.

DIED NOVEMBER 29TH, 1883.

ARTHUR SPIELMANN was born in Hoboken, N. J., in the year 1847. His parents, who were natives of Germany, of distinguished intelligence and culture, gave a personal oversight to his early education. After receiving careful tuition in the English branches and the modern languages, he acquired a theoretical knowledge of his future profession in the School of Engineering of the University of the City of New York, graduating in 1867. While pursuing his studies at the University he also received instructions in architecture at the Cooper Union, and acquired proficiency in technical drawing. With a degree of self-dependence not always manifested he, immediately after graduation, undertook, upon his own account, the preparation of an extensive set of maps of his native County of Hudson for the use of insurance companies. This work occupied his time for two years, resulted successfully, and brought him into notice.

His professional labors fairly commenced in 1869, when he associated with himself a friend and former classmate at the University, Mr. Charles B. Brush, M. Am. Soc. C. E., and opened an office at Hoboken. This connection only terminated with Mr. Spielmann's death; through it he became identified with all the more important municipal and sanitary

NOTE.—Committee to prepare memoir: Charles B. Brush, M. Am. Soc. C. E., and L. B. Ward, M. Am. Soc. C. E.

improvements that have been undertaken in the northern part of Hudson County. This territory is divided into a number of contiguous suburban towns which required, in addition to the ordinary local works of street and sewer construction, an arterial system of roads with accessory works of main drainage, and a general system of water supply. The successful execution of these works, which depended not only upon the application of scientific knowledge and judgment, but also upon his comprehension of the methods of administration adapted to secure the highest practical results where, as for the purposes of drainage, areas or districts have to be dealt with irrespective of municipal boundaries, is sufficient proof of his capacity.

As Mr. Spielmann's practice increased he devoted much attention to the execution of borings for subterranean water supply, and for determining the relation of earth strata. He was frequently employed in directing preliminary surveys and examinations for proposed works; and was indefatigable in compiling maps of a statistical and technical character, many of which he published. For a time he was connected with the construction of the Hudson River Tunnel, his firm being the engineers in charge of the work at the commencement of the excavation under the river on the New Jersey side, and he was engaged, at the time of his death, in conducting surveys and soundings for the projected tunnel under the same river, opposite Communipaw.

Mr. Spielmann's life was shortened by his devotion to his profession. In the course of his labors the problem of the sewerage of Hoboken came up for solution. A portion of that city stands upon an embanked meadow, over a marsh of such depth as to be incapable of being permanently raised above tide level. Examples of sewerage works under similar conditions are wanting in the United States, but he applied himself with characteristic energy to the study of the subject, and to the task of procuring the adoption of his plans by the local authorities. Before he had succeeded in this he was prostrated by a cerebral attack which for a time incapacitated him for work, and permanently undermined his strength. During an enforced vacation he spent a year in Europe, where he continued his special studies in drainage. Having a familiar knowledge of the principal modern languages, he visited and conferred personally with the ablest engineers in France, Germany and England; he also used the opportunity to inspect the methods of low-level drainage in use in Holland, and acquired a large fund of information on this topic. Although his health appeared much benefited by this journey, so that he was able to resume his work, he lived but a few months after his return. He died in this city, of pneumonia, November 29th, 1883.

Mr. Spielmann, while a man of active temperament and determined to achieve results, had a courteous manner, which, added to many personal accomplishments, made him at all times an agreeable companion,

and procured him many warm and enduring friendships. He was one of a numerous family, to the members of which he was warmly attached, and he remained unmarried.

It should be mentioned in connection with Mr. Spielman's professional career that from 1874, in addition to his numerous practical duties, he filled the chair of Adjunct-Professor of Civil Engineering in the University of the City of New York.

Mr. Spielmann entered the Society as an Associate, March 5th, 1873, and was elected a Member, September 5th, 1877.

LIST OF MEMBERS.

ADDITIONS.

MEMBERS.

| | | Date of Election. |
|------------------------------|---|-------------------|
| ABBOT, FREDERIC VAUGHAN..... | 1st Lieut. Corps Engineers, U. S. A., Fernandina, Fla. | Dec. 3, 1884. |
| BALDWIN, FRED. HIXON..... | Ass't Engineer, Aqueduct Commissioners, Box N, Tarrytown, N. Y..... | Nov. 5, 1884. |
| BOYNTON, GEORGE HERBERT..... | Assistant Engineer, Chicago, Rock Island and Pacific Ry., Davenport, Iowa..... | Sept. 2, 1884. |
| BURPEE, MOSES..... | Chief Engineer, New Brun- swick Ry., Gibson, N. B., Canada | " " |
| CRAVEN, HENRY SMITH..... | Civil Engineer, U. S. N., En- gineer of Construction, Aqueduct Commissioners, Tarrytown, N. Y..... | Dec. 3, 1884. |
| HAWES, JAMES DUDLEY..... | Chief Engineer, Michigan Central Ry., Detroit, Mich. | " " |
| HODGDON, FRANK WELLINGTON.. | Assistant Engineer, Harbor and Land Commissioners, 65 Bowdoin street, Boston, Mass..... | " " |
| KUICHLING, EMIL..... | Principal Assistant Engineer, Water Works, Rochester, N. Y..... | Sept. 3, 1884. |
| LANDRETH, OLIN HENRY..... | Vanderbilt University, Nash- ville, Tenn..... | " " |
| MERSEREAU, CHARLES VERNON... | U. S. Engineers' Office, Cust- om House, St. Louis, Mo. | Dec. 3, 1884. |
| SCOTT, CHARLES ARMSTRONG.... | General Manager, Nova Sco- tia Government Rys., Que- bec, Canada | Nov. 5, 1884. |

| | | |
|--------------------------------|--|----------------|
| SMITH, OBERLIN..... | Bridgeton, N. J..... | Sept. 3, 1884. |
| SOSA, PEDRO JOSE..... | Chief of Hydrographical, Topographical and Locating Departments, Panama Canal, Panama, U. S. Colombia..... | Dec. 3, 1884. |
| TUBBS, JOSEPH NELSON..... | Chief Engineer, Water Works, Rochester, N. Y..... | Sept. 3, 1884. |
| WOODBURY, CHARLES JEPHTA HILL, | 31 Milk street, Boston, Mass. | Dec. 3, 1884. |

JUNIOR.

| | | |
|---------------------------|--|---------------|
| CHAPIN, LOOMIS EATON..... | First Assistant City Engineer, Toledo, Ohio..... | Dec. 3, 1884. |
|---------------------------|--|---------------|

CHANGES AND CORRECTIONS.

MEMBERS.

| | |
|---------------------------|--|
| BATES, ONWARD..... | Gilfillan Block, Room 46, St. Paul, Minn. |
| BRAINARD, HENRY A..... | (Care Santa Clara Valley), San Jose, Santa Clara Co., Cal. |
| BURNS, EDWARD C..... | 34 Congress street, West, Detroit, Mich. |
| CORNELL, OLIVER H. P..... | 49 Downing street, Brooklyn, N. Y. |
| CORTHELL, E. L. | Chief Engineer, Tehuantepec Ship Ry., 34 Nassau street, New York City. |
| CUNNINGHAM, DAVID W..... | 308 Garrard street, Covington, Ky. |
| EADS, JAMES B..... | 34 Nassau street, New York City. |
| FLINT, EDWARD A..... | (Care Edward P. Gore), 1926 Indiana avenue, Chicago, Ill. |
| FRAZIER, JAMES L..... | Superintendent Chesapeake, Ohio and Southwestern R.R., 258 W. Main st., Louisville, Ky. |
| GRISWOLD, FRANK L..... | 44 Balcarce, Buenos Ayres, Argentine Republic. |
| JOHNSON, THOMAS H..... | Principal Assistant Engineer, Pittsburgh, Cincinnati and St. Louis Ry., Columbus, Ohio. |
| JUDSON, JOHN A..... | 71 Washington street, Room 6, Chicago, Ill. |
| KATTÉ, WALTER..... | Chief Engineer, New York, West Shore and Buffalo Ry. (Forty-second Ferry, North River), New York City. |
| LOWETH, CHARLES F..... | 560 Drake Block, St. Paul, Minn. |
| MAN, ALBON P., JR..... | Purchasing Agent, St. Louis and San Francisco R. R., Temple Building, St. Louis, Mo. |

| | |
|---------------------------|---|
| MASTEN, C. S..... | Moberly, Mo. |
| MORSS, FOSTER..... | Red Falls, Greene Co., N. Y. |
| NEILSON, CHARLES..... | Assistant to President, Laffin and Rand Powder Co., 29 Murray st., New York City. |
| O'ROURKE, JOHN F..... | 162 East One Hundred and Fifth street, New York City. |
| OSGOOD, JOSEPH O..... | Milton, Mass. |
| PAINE, CHARLES..... | 74 West Thirty-fifth street, New York City. |
| PRATT, WILLIAM A..... | Division Engineer, West Virginia and Penn- sylvania R. R., Clarksburg, W. Va. |
| ROTCH, WILLIAM..... | 8 Exchange Place, Boston, Mass. |
| SEYMOUR, CHARLES..... | Chief Engineer, Indiana and Illinois Southern R. R., Palestine, Ill. |
| SIMPSON, GEORGE H..... | (Care W. D. Shields, Car Accountant, Alle- gheny Valley R. R.), Pittsburgh, Pa. |
| SMITH, W. HARRISON..... | Assistant Engineer, Northern Central R. R., Box 280, Newark, N. Y. |
| STRONG, CHARLES H..... | 1357 Wilson avenue, Cleveland, Ohio. |
| WALKER, WILLIAM W..... | President, St. Louis, Hannibal and Keokuk R. R., Cedar Rapids, Iowa. |
| WATKINS, FREDERICK W..... | Assistant Engineer of Construction, Aqueduct Commissioners, 118 East One Hundred and Fifteenth street, New York City. |
| WHEELER, E. S..... | Superintendent, St. Mary's Falls Canal, De- troit, Mich. |

ASSOCIATE.

| | |
|----------------------|--|
| HENDRIE, JOHN S..... | Contractor, Northern and Pacific Junction Ry., Bracebridge, Muskoka, Ontario, Canada. |
|----------------------|--|

JUNIORS.

| | |
|--------------------------|---|
| CORNELL, GEORGE B..... | Chief Engineer, Brooklyn Elevated R. R., 31 Fulton street, Brooklyn, N. Y. |
| GAY, MARTIN..... | 60 West Thirty-eighth street, New York City. |
| HAVILAND, ARTHUR..... | 594 East One Hundred and Forty-fourth street, New York City. |
| NOYES, ELLIS B..... | 42 Fort Green Place, Brooklyn, N. Y. |
| PARSONS, W. BARCLAY..... | Elmira, N. Y. |
| WHITLOCK, FRANK W..... | City Engineer's Office, Post Office Box 715, Waterbury, Conn. |

DEATHS.

- ALLAIRE, WILLIAM M.....Elected Junior, March 2d, 1881; died December 14th, 1884.
- JORDAN, GABRIEL.....Elected Member, September 18th, 1872; died November 10th, 1884.
- SHREVE, SAMUEL H.....Elected Member, May 19th, 1869; died November 27th, 1884.
- WELLS, DANIEL L.....Elected Fellow, June 13th, 1883; died November 24th, 1884.

482
P.
121*
Proc.

Pages 122 to 125
inclusive complete
Vol. 10 of Proceedings

American Society of Civil Engineers.

PROCEEDINGS.

Vol. X.—December, 1884.

MINUTES OF MEETINGS.

(Abstract of such as may be of general interest to members.)

OF THE SOCIETY.

DECEMBER 3, 1884.—The Society met at 8 P. M., Vice-President William H. Paine in the chair; John Bogart, Secretary. The following candidates were elected as Members: Frederic Vaughan Abbot, Fernandina, Fla.; Henry Smith Craven, Tarrytown, N. Y.; James Dudley Hawks, Detroit, Mich.; John Thomas Henthorn, Providence, R. I.; Frank Wellington Hodgdon, Boston, Mass.; Charles Vernon Mersereau, St. Louis, Mo.; Albert Franklin Noyes, West Newton, Mass.; Pedro J. Sosa, Panama, U. S. of Colombia; Charles Jephtha Hill Woodbury, Boston, Mass. As Juniors: Loomis Eaton Chapin, Toledo, Ohio; Harold Edward de Raasloff, New Tacoma, Washington Territory; Roger Tappan, Haverhill, Mass.

Announcement was made of the deaths of Daniel L. Wells, F. Am. Soc. C. E., on November 24th, 1884, and of Samuel H. Shreve, M. Am. Soc. C. E., on November 27th, 1884.

A communication from the Civil Service Commission of the State of New York was presented, requesting a conference in reference to standards of qualification for the several grades of engineers and their subordinates employed by the State. The communication was referred to the Board of Direction with power to act.

A collection of samples of building materials used in ancient Rome, presented to the Society by Sig. Felice Cicconetti, a distinguished architect of Rome, was exhibited.

* Printed by the
on back of P. 481 - 12.

A paper by A. M. Wellington, M. Am. Soc. C. E., upon Experiments with New Apparatus on Journal Friction at Low Velocities, was discussed by Messrs. F. Collingwood, Theodore Cooper, Charles E. Emery, William H. Paine and A. M. Wellington, and by letter by Messrs. W. S. Auchincloss, John W. Cloud, Wilson Crosby, Charles Paine, R. H. Thurston, Beauchamp Tower, H. R. Towne, D. J. Whittemore, and F. M. Wilder.

DECEMBER 17, 1884.—The Society met at 8 P. M., Mr. F. Collingwood in the chair; John Bogart, Secretary.

Announcement was made of the death on December 14, 1884, of William M. Allaire, Jun., Am. Soc. C. E., elected as such, March 2, 1881.

A paper was read on Mexican Bridge Construction by J. F. Flag, M. Am. Soc. C. E., and discussed by Messrs. T. C. Clarke, Theodore Cooper, R. L. Harris, E. P. North, A. F. Sears and A. M. Wellington.

A paper on Excavation and Embankment by water power by E. B. Dorsey, M. Am. Soc. C. E., was read, and discussed by Messrs. F. Collingwood, C. E. Emery, R. L. Harris, E. P. North and D. McN. Stauffer.

OF THE BOARD OF DIRECTION.

DECEMBER 3, 1884.—Applications were considered. The Committee appointed in accordance with the resolution of the Society of September 3, to present for discussion at the Annual Meeting in January next, regulations regarding the reading and discussion of papers at the Annual Convention, presented through Mr. E. P. North, M. Am. Soc. C. E., Chairman of the Committee, suggestions for such regulations. These suggestions, after discussion and amendment, were approved by the Board of Direction and ordered to be issued to the members of the Society. They are as follows:

In view of the fact that a number of members of the Society have expressed the opinion that our Conventions have not been giving satisfactory results, and particularly that the number of days to which they are necessarily limited does not give sufficient time for all that has been attempted; and in view also of the fact that the Board has been particularly requested to consider whether some modifications might not be properly made in the conduct of the Conventions, the following considerations are presented by the Board to our members.

These considerations are in harmony with a report prepared by a committee of members of the Society appointed to consider the subject.

It has been evident to those who have attended the Conventions of the last few years that some modification should be made, if the best results, which are believed to be practicable, are to be hereafter secured.

Some of the undesirable features are:

(1.) The entirely too limited time given to the presentation and discussion of professional papers.

(2.) The entirely too large amount of time taken up in local excursions and visits by the whole body of the Convention to points and objects which are not really of general interest.

(3.) The feeling of obligation which arises from the fact that members, resident at the place of the Convention, have raised large sums of money through contributions from themselves, and from other persons generally interested in engineering, or desiring that the Society should enjoy its visit; and, in this connection, the feeling that the money must be spent in providing the excursions alluded to, and in furnishing entertainments which are of a more elaborate character than is requisite for the entire enjoyment of the members and visitors.

All of these considerations are interdependent; they have arisen from no special fault on the part of any who have been active in promoting past Conventions; but the feeling that a change ought to be made certainly exists, and certainly should be considered.

It is suggested that an entirely new method of holding our Conventions may be tried with sufficient promise of success to warrant the experiment, and this new method, in general terms, may be:

To hold a Convention not at any large city, nor upon the invitation of local members; but to secure, if possible, a place where all can be accommodated in a proper way, and where the Convention can be arranged and managed entirely with reference to the best assurance of carrying out the objects which make it desirable that Conventions should be held. It is suggested that these objects are:

(a.) The presentation, consideration and undisturbed discussion of professional subjects.

(b.) The opportunity for free intercourse between members of the Society gathering at our Conventions from all parts of the United States, and, in fact, of the world.

(c.) Such opportunities for social recreation as may not interfere with, but rather aid the other two objects mentioned above.

It is suggested that the Convention can be held at some large hotel, preferably not in a city. Those who were present at the St. Paul and Minneapolis Convention of last year will remember the Hotel Lafayette, at Lake Minnetonka. There are other hotels in other parts of the country fully as large, and located, many of them, in delightful situations. Doubtless, a committee of the Board of Direction can find such a location and can secure ample accommodations on reasonable terms, where all the requisites for comfortable meetings can be had, where the opportunity will be afforded for pleasant intercourse, and where no calls will be made upon the members which will interfere either with the professional or social enjoyment of the occasion.

Some of our members who have discussed this subject have already made inquiries and have found several such places. With proper arrangements, the meetings of the Society during the Convention, held in

such a hotel, would give ample time for entirely free and uninterrupted discussion. The classification of papers and subjects, as suggested in a circular accompanying this, could be made to add largely to the interest of discussions. The hours not devoted to meetings would give excellent opportunities for the more intimate acquaintance of our members with each other. Every provision could be made for the comfort of the members and their families without interfering with the other objects of the Convention.

It is suggested that the experiment be tried, and that the Board of Direction be authorized to secure such provisions for the next Convention as have been outlined above.

The Board asks for this subject the earnest consideration which its great importance to the welfare of the Society demands.

A blank form for the return of the views of members is sent herewith, and it is particularly requested that these be filled out and forwarded to the Secretary. The replies will be reported to the Annual Meeting, when the subject will be considered.

PROPOSED REGULATIONS AS TO THE PRESENTATION, READING AND DISCUSSION OF PAPERS AT CONVENTIONS.

Members of the Society to be informed that papers submitted for reading at any Annual Convention should be in the hands of the Secretary at least 40 days before the date of such Convention.

Members also to be informed that papers which are not received in time to conform to this rule can only take the chance of being presented to the Convention after the reading and discussion of the papers which have been so submitted.

When papers are received in accordance with this regulation, and have been accepted by the Committee for presentation, the Secretary to have concise abstracts made of each paper, and to mail these abstracts to each member of the Society, with a request that discussion be prepared, and also that each member who is willing and desirous to take part in the discussion shall so inform the Secretary. More detailed information as to a particular paper may be furnished to members desiring to discuss it.

In preparing the programme for the Convention, the papers to be classified, so that as far as practicable definite classes of subjects may be considered at the same time, and notices of this classification, and of the times when particular subjects are to be considered, to be prepared and posted. The discussions upon particular subjects and papers to be opened by members, in an order to be designated by the Chairman of the Convention, and afterwards the discussion to be general.

A committee, to be appointed by the Board, of members who are to be present at the Convention, which committee will aid the Secretary

in arrangements for the presentation and discussion of papers, and in perfecting other requisite details for the Convention.

The Presiding Officer was authorized to appoint a Committee of Arrangements for the approaching Annual Meeting. The Committee appointed is as follows: F. Collingwood, D. McN. Stauffer and John Bogart.

A communication from the President of the New York State Civil Service Commission was read and directed to be presented at the next meeting of the Society.

A circular letter was ordered to be sent to members more than one year in arrears for dues, and to whom the form directed in the Constitution had been sent July 1, 1884.

DECEMBER 10, 1884.—Applications were considered; financial business transacted.

LIST OF MEMBERS.

ADDITIONS.

JUNIORS.

| | Date of Election. |
|--|-------------------|
| SCHAUB, JULIUS WILLIAM.. (Care of C. Shaler Smith), Bridge Entrance, St. Louis, Mo. | November 5, 1884 |
| TAPPAN, ROGER..... Room 28, Academy of Music, Haverhill, Mass. | December 3, 1884 |

RESIGNATIONS.

MEMBERS.

| | |
|--------------------------|-------------------|
| CLARKE, FREDERICK W..... | December 31, 1884 |
| GOULD, JAMES P..... | " " " |
| JAMES, SAMUEL L..... | " " " |
| SPENCER, THOMAS W..... | " " " |
| WEIR, CHARLES G..... | " " " |

ASSOCIATE.

| | |
|----------------------|-------------------|
| HARDY, ARTHUR S..... | December 31, 1884 |
|----------------------|-------------------|

41 715 2

in

of
ctee
ohn

ivil
ext

one
itu-

usi-

ction,

1884

1884

1884

“

“

“

“

1884